



Product subject to and compliant with
EU Erp Regulation 1253/14

Recovery units ENERGY PLUS VERTICAL UNITS



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INTRODUCTION

The Energy Plus Vertical versions high-efficiency heat recovery ventilation units are designed to provide centralised air exchange service in commercial environments or residential blocks, complying with ErP 2018 requirements and ensuring high standards of fresh air filtration.

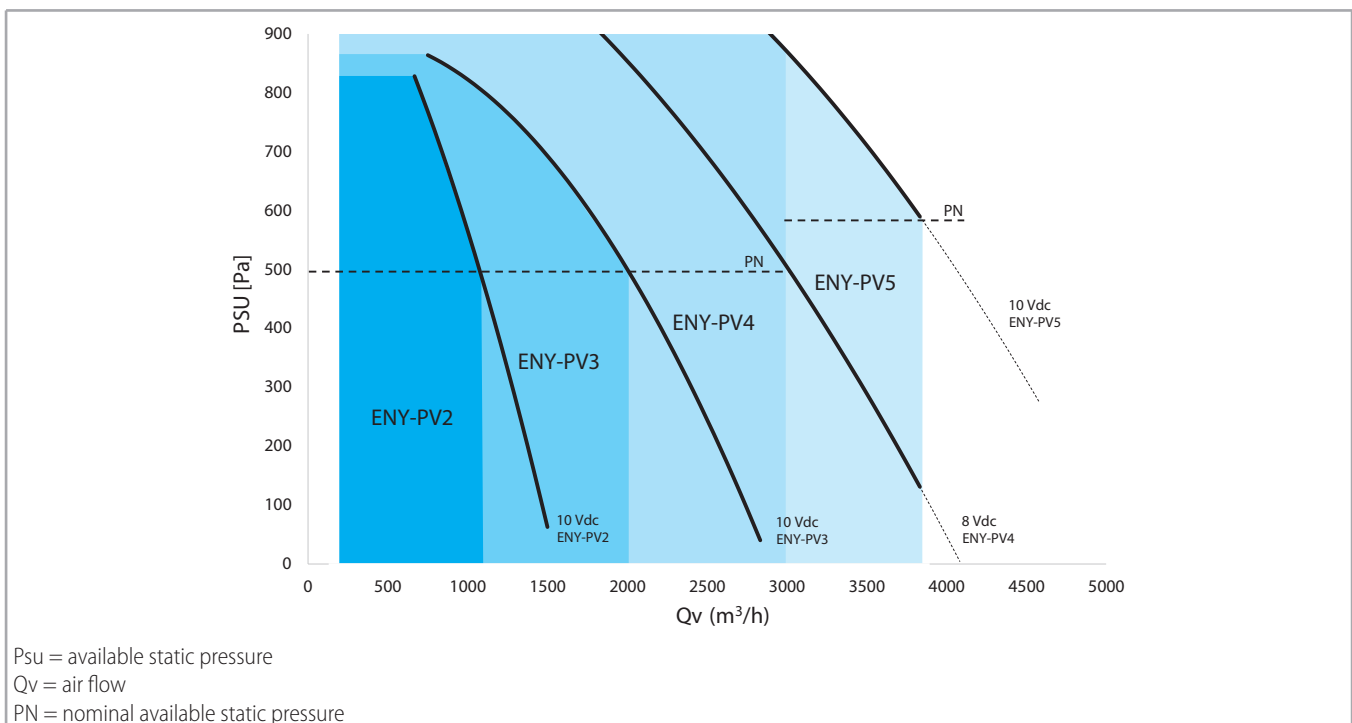
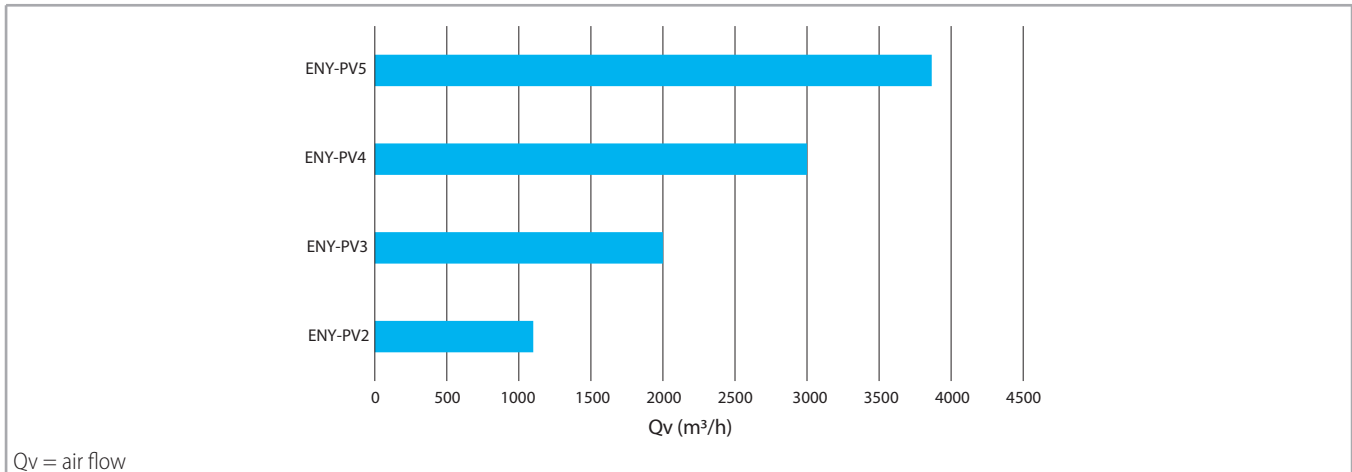
The Energy Plus Vertical units are full fresh air units and are designed to guarantee almost absolute separation of the supply and extraction flows and maximum heat recovery, thanks to the use of static counterflow aluminium plate heat exchangers.

The Energy Plus Vertical versions includes 4 sizes, suitable for floor to wall installation, and covers a range of flow rates from 1100 to 3850 m³/h.

The units are compact monobloc units with overlapping sections, with the aim of minimizing the floor space required for installation with the same reprocessed flow rate.

All the standard units are equipped with the adjustment and control system according to the most advanced logics available in the sector.

Fan adjustment is available with constant flow control, a recommended solution for single zone ventilation system applications, and with constant differential pressure control, a recommended variable air flow rate solution in multi-zone applications with adjustment dampers dedicated to individual zones.



AVAILABLE VERSIONS

Energy Plus Vertical units are supplied in multiple versions for each size.

The available configurations are highlighted below, which can be interpreted from the identification code of each unit:

Product ID	Size	Max. flow rate [m ³ /h]	Ventilation Control	Equipment per version	Connection Configuration
ENY-PV2QL	2	1100	Constant flow rate	BASIC	Left
ENY-PV2QR	2	1100			Right
ENY-PV2QEL	2	1100		With heater	Left
ENY-PV2QER	2	1100			Right
ENY-PV2DPL	2	1100	Constant differential pressure	BASIC	Left
ENY-PV2DPR	2	1100			Right
ENY-PV2DPEL	2	1100		With heater	Left
ENY-PV2DPER	2	1100			Right
ENY-PV3QL	3	2000	Constant flow rate	BASIC	Left
ENY-PV3QR	3	2000			Right
ENY-PV3QEL	3	2000		With heater	Left
ENY-PV3QER	3	2000			Right
ENY-PV3DPL	3	2000	Constant differential pressure	BASIC	Left
ENY-PV3DPR	3	2000			Right
ENY-PV3DPEL	3	2000		With heater	Left
ENY-PV3DPER	3	2000			Right
ENY-PV4QL	4	3000	Constant flow rate	BASIC	Left
ENY-PV4QR	4	3000			Right
ENY-PV4QEL	4	3000		With heater	Left
ENY-PV4QER	4	3000			Right
ENY-PV4DPL	4	3000	Constant differential pressure	BASIC	Left
ENY-PV4DPR	4	3000			Right
ENY-PV4DPEL	4	3000		With heater	Left
ENY-PV4DPER	4	3000			Right
ENY-PV5QL	5	3850	Constant flow rate	BASIC	Left
ENY-PV5QR	5	3850			Right
ENY-PV5QEL	5	3850		With heater	Left
ENY-PV5QER	5	3850			Right
ENY-PV5DPL	5	3850	Constant differential pressure	BASIC	Left
ENY-PV5DPR	5	3850			Right
ENY-PV5DPEL	5	3850		With heater	Left
ENY-PV5DPER	5	3850			Right

Interpretation of the identification code: e.g. ENY-PV2QEL

ENY-PV	2	Q	E	L
PRODUCT RANGE		VENTILATION CONTROL	EQUIPMENT	CONNECTION CONFIGURATION
"Energy Plus Vertical"	SIZE 2/3/4/5	Q - constant flow rate	"" - BASIC EQUIPMENT	L - left fresh air intake
		DP - constant differential pressure	E - With heater	R - right fresh air intake

It is very important to select correctly the unit configuration in terms of Size, Ventilation Control, Equipment and Connections Configuration because it is not possible to make any changes after the purchase.

MAIN COMPONENTS

Components

External casing

Structure made up of aluminium frame with Sabiana double recess profile and sandwich panels with double sheet and polyurethane foam insulation.

The 35 mm thick aluminium profiles are shaped to guarantee the double recess of the panels, perfect flatness and maximum ease of cleaning the internal surfaces.

The panels are supplied with a thixotropic gasket that allows the best continuity of the seal towards the outside.

Special attention is paid to internal sealing and insulation in order to avoid any contamination of flows.

Panels and frames are suitable to support the required mechanical stresses and reduce thermal dispersion with respect to the installation environment or risks of external surface condensation.

The standard degree of protection of the units is such that it is necessary to install them in closed or covered rooms, with temperatures in the installation environment that do not fall permanently below 0 °C.

Fans

The units are supplied with electronic plug fans equipped with EC synchronous motors with very high electrical efficiency.

The design of the impellers is of the backward curved blade type in order to minimize water leakages.

The design of the supply section is such as to optimize the flows inside and obtain high levels of ventilation efficiency while minimizing inefficiencies and noise.

The fans allow the units to reach available static pressures up to 1000 Pa. Such high pressures may be required in the case of particularly complex multi-zone applications where, for example, different fire compartments are crossed.

Fans are equipped with a pressure probe on the calibrated nozzle of the fan used in the case of control aimed at the target flow rate.

In this way the control is realized using the reliable method of indirect calculation by measuring the differential pressure at the inlet.

Heat exchangers

The units are supplied with static counterflow heat exchangers with aluminium plates that have been sized to meet the requirements of the ErP 2018 regulation for ventilation units, both to minimize the pressure drops occurring inside the units and to maximize the heat

recovery efficiencies within the expected range of operating flow rates (EN 308 efficiency up to 85% in dry conditions).

The choice of the exchanger is strategic in order to guarantee, besides the energy recovery, also the absence of contamination between the flow that carries the exhaust air, breathed by the internal occupants, and the fresh air coming from outside.

For larger units, the recovery units are subdivided into modules in order to limit handling weights and keep the front inspection spaces within small distances.

By-pass damper

The units are equipped with by-pass duct in line with the heat exchanger and with damper modulating 100% of the air flow between the path crossing the heat exchanger for heat recovery and the path avoiding it, passing through the same by-pass duct.

In this way the unit can take full advantage of the free air conditioning capacities of the fresh air if available, without affecting the inlet temperature into the environment due to undesired heat recovery.

The by-pass channel is sized in such a way as to keep the pressure drops inside the ventilation unit unaltered in case of opening of the by-pass, in order to allow the stable and continuous operation of the electronic fans and their controls.

Filters

As proof of the maximum attention paid to the cleanliness of the inlet air and to safeguard the durability of the internal equipment, the units are fitted as standard with ISO ePM₁ 55% filters on the fresh air flow and ISO ePM₁₀ 55% filters on the outlet flow.

In compliance with the ErP 2018 regulation, in order to facilitate routine maintenance operations, each filtration section is equipped with a differential pressure switch with alarm signal return to the panel.

This signal is enabled when the maximum allowed uncleanliness pressure drop level is exceeded.

Maximum attention is paid to the perimeter gasket of the filters to avoid any by-pass and to convey all the flow through the filtering fabric.

For larger units, the filters units are subdivided into modules in order to limit handling weights and keep the front inspection spaces within small distances.

Adjustment and control system

The units are fully equipped with the necessary electronics and sensors for operational use.

- Central electronics configurable on Siemens platform and Modbus communication protocol for external supervision
- Siemens display wall control, supplied as standard for manual control of the unit and alarm signalling
- No. 4 temperature probes, for each air flow interface point with the unit
- No. 2 differential pressure switches for filter replacement indication
- No. 2 differential pressure transducers and integrated pneumatic circuits to allow the control of fans with flow rate or differential pressure target
- No. 1 modulating actuator for the adjustment of the by-pass damper according to the neutral supply temperature of inlet air
- No. 1 relay available for remote alarm status communication
- Possible integrations with:
 - RH/CO₂ duct or ambient air quality probes (not supplied by Sabiana)
 - Shut-off dampers supplied with spring return actuators operated in synchrony with machine switching on/off
 - Hydronic coils or modulating electric batteries or ON/OFF (not supplied by Sabiana)

Electric heaters

In the case of application in particularly rigid climatic conditions, the units are also available in a version with integrated electric heater.

The integrated heaters are of the modulating type with the aim of maintaining the air outlet temperature outside the risk of freezing.

The type of heater has a rectangular section, with armoured leads and thermostats with automatic and manual reset. In any case, the opening of any safety thermostat causes the emergency shutdown of the ventilation unit.

The units with heater are equipped with a micro-switch for automatic disconnection of the power supply to the heating element, which is activated when the filter replacement cover is opened, from which the heater itself is accessible.

Post treatment

By using the ENY-PV Manager software it is possible to set the management of hydronic or electric coils for the unit outlet temperature control (not supplied by Sabiana).

It is possible to set a modulating control and/or an ON/OFF.

The two controls can not operate simultaneously (e.g. simultaneous use of heating and cooling coil).

By means of the ENY-PV Manager software it is possible to modify the outlet temperature setpoint for the heating and/or the cooling.

INSTALLATION

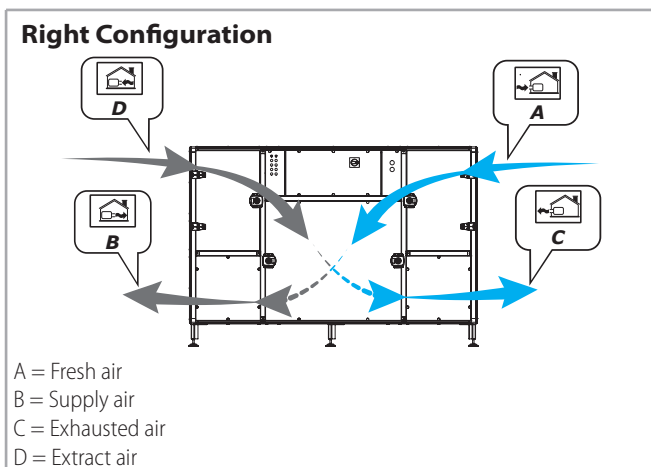
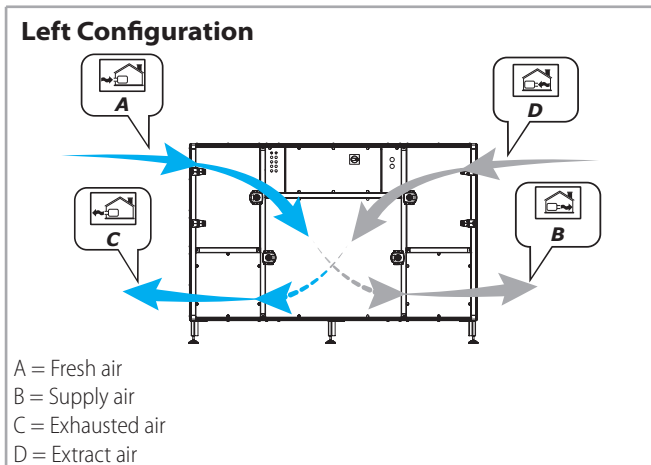
In order to occupy the minimum surface area, the ENY-PV units are designed to be placed on the floor with the possibility of being leaned against a wall.

The characteristics of versatility and safety of interaction with the ENY-PV unit can be summarised in the following points.

Factory versions

In order to guarantee the ideal combination with respect to the available air distribution system, each size of ENY-PV, whether or not equipped with an integrated electric heater, is available from the factory in a right or left version.

The right and left versions also have different internal positioning of the condensate drain pans and integrated electric heater, if provided, as well as the inversion of the position of the ePM₁ 55% and ePM₁₀ 55% filters.



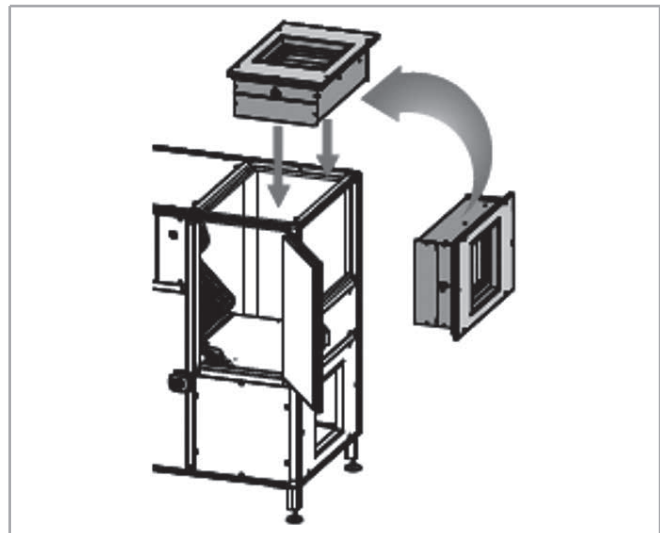
The left or right side connections configuration can not be carried out after the purchase. The unit must be selected according to the necessary construction details configuration.

Side connection from factory or higher modified on the spot

Each ENY-PV unit is supplied from the factory in the configuration with fresh air connections and room air outlet located on the sides.

However, it is possible to modify each unit on the spot by removing the "panels with outlets + filters" assemblies from the side and reassembling them on the upper faces.

In this way, each unit can be transformed from a machine with side attachments to a machine with fully upper or mixed attachments as desired.



Modification on the spot is possible for any size except ENY-PV5 units, for which requests for special connections can be made.

Openings for maintenance

The ENY-PV units are designed to be wall mounted with the rear panels and to connect to the air distribution ducts with the outlets placed on the perimeter faces of the sides and/or placed on the upper faces.

The inspection of each component can be done from the front, interacting with panel types described below.

Maintenance inspections or routine access

- Doors can be opened by means of a handle with lock and hinges for easy filter replacement.
- In the bigger units the filters are foreseen in modules of no. 2 components, in order to limit the front depth required for the replacement
- In the case of units with integrated heaters, the opening of the door lid triggers a safety micro-switch that interrupts the power supply to the heater if the operator has not followed the safety instructions in the manual.

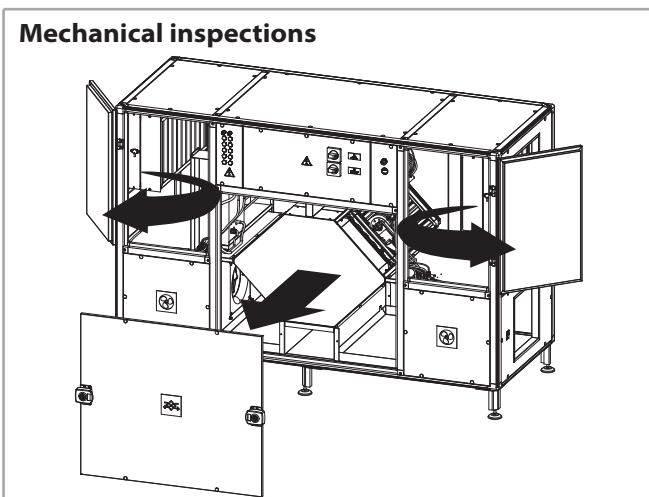
- Front exchanger inspection panel removable by undoing the fixing screws and acting on two handles equipped with key lock. The rigid removal of the panel allows the opening operation to be carried out in the minimum space necessary in front of the unit.
- Front panels for access to the integrated electric panel. Thanks to the application of threaded inserts in the aluminium frame, it is possible to disassemble and re-assemble the access panel to the electric panel several times, in order to make the necessary auxiliary electrical connections, check the operating parameters and the available monitoring data in the electronic board. The front of the electrical compartment is divided into 3 panels in order to allow maximum ease of handling during auxiliary wiring operations and at the same time to ensure maximum electrical safety.

- Removing the front exchanger inspection panel, in order to remove and replace them, it is possible to carefully disassemble the guides and remove the seals that hold the elements in place and guarantee sealing. In the larger units, the exchangers are divided into 2 modules of reduced depth, in order to minimise the space required for overtime maintenance in front of the unit.

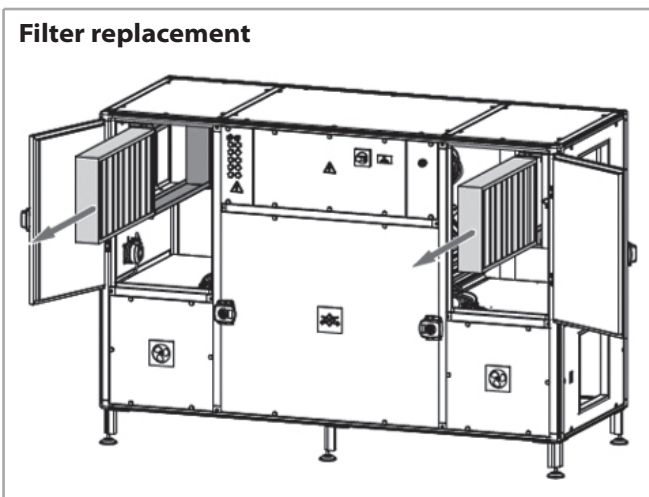
The appliance must be installed in a room protected from frost.

The room shall have a water drainage connection to drain off any condensate that may form.

Mechanical inspections

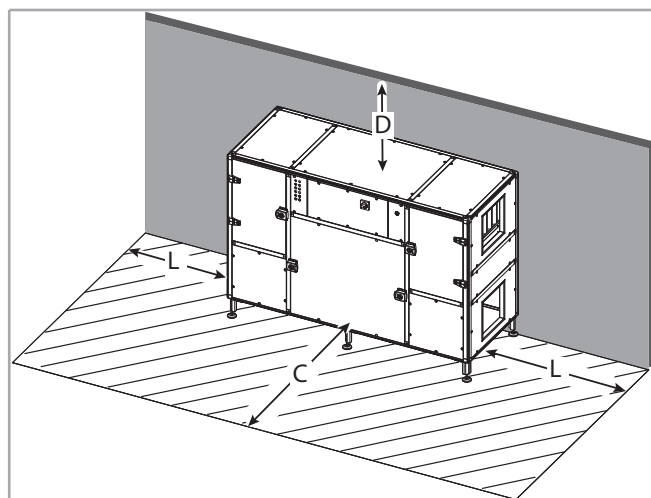


Filter replacement



Maintenance openings or special access

- Fixed screwed panels to inspect the operation of the electric fan units



Model	C	D	L
Minimum dimensions (mm)			
ENY-PV	1500	900	600

When the unit is positioned, there must be sufficient space around the unit to ensure proper operation and maintenance.

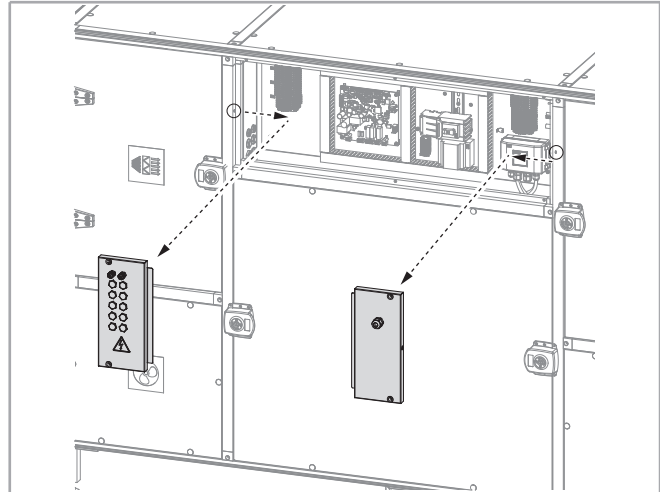
The figure and table above indicate the dimensions of the minimum recommended spaces.

Electrical safety

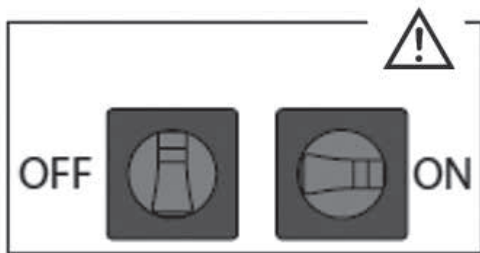
The units are powered in single-phase (ENY-PV2) or three-phase (ENY-PV3-4-5) mode and can absorb significant currents if they are equipped with integrated heaters.

For this reason, the units range has been designed to minimize the risks associated with failure to comply with the safety operations indicated in the manual, among which the most important operation is that of interrupting, before each intervention, the power supply to the unit from the dedicated external panel:

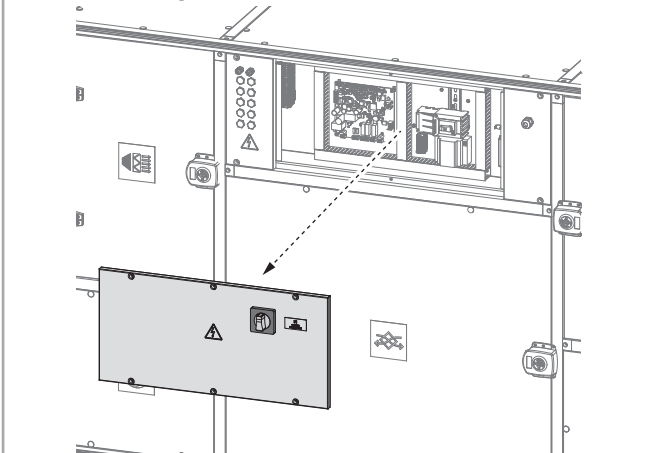
- The supply line to the fans and heaters is independently provided with knob-type disconnectors, with a return rod at the front, for the manual interruption, before any access, of the power to the internal live or moving elements and for the supply of power after the reconnection of the external switchboard.
- The return rod on the front of the disconnector knobs is integral with the front panel. If this panel is inadvertently removed without turning the external knobs to the OFF position, the removal of the rod automatically interrupts the power supply to the power lines
- The side panels for access to the power or auxiliary terminals are mechanically locked so that they cannot be removed without first disconnecting the power lines on the central panel and removing the panel itself
- The compartments enclosing live elements are all marked with labels indicating the presence of electrical currents and the need to act with caution
- In the case of units with integrated heater, the filter access doors are equipped with a safety micro-switch that interrupts the power supply to the leads when the door is opened



Electrical safety



Electrical inspections



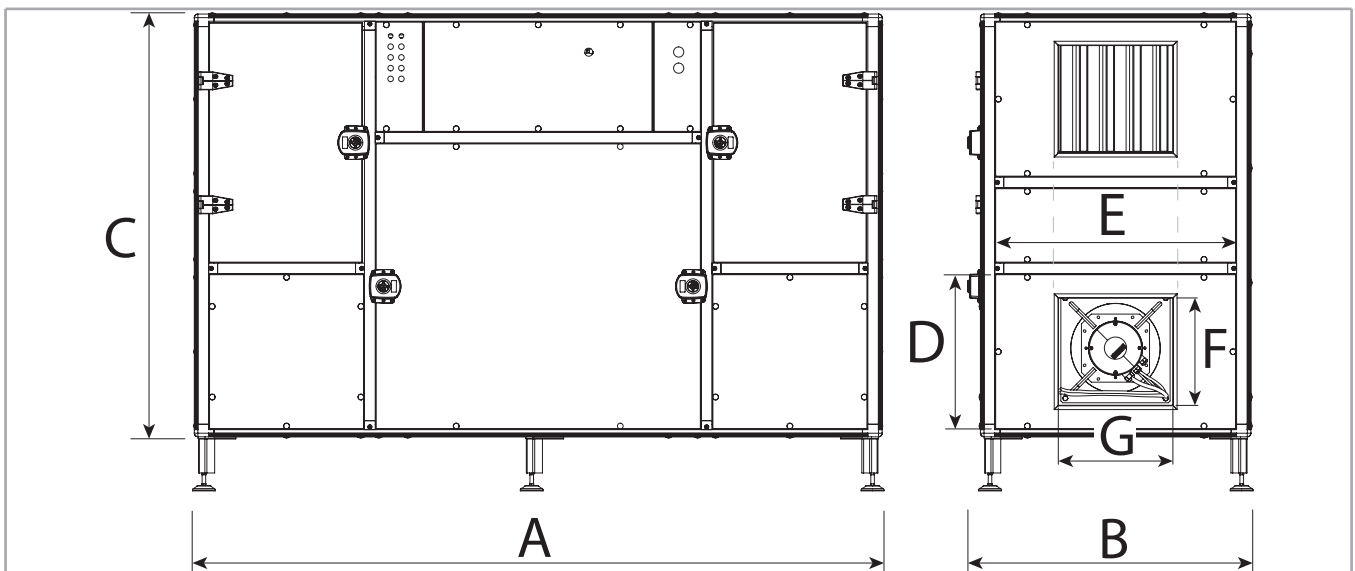
The side panels can only be removed if there is no central panel.

TECHNICAL DATA

Technical data table

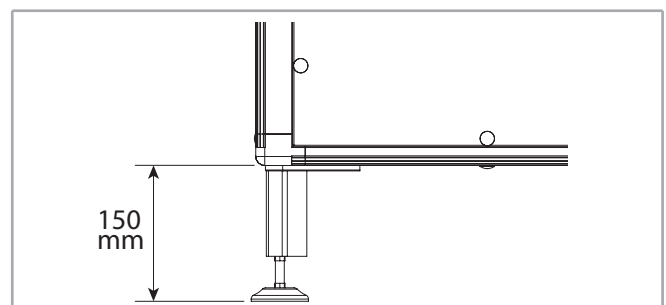
	UoM	ENY-PV2	ENY-PV3	ENY-PV4	ENY-PV5
Nominal flow rate	m ³ /h	1100	2000	3000	3850
Nominal available static pressure	Pa	500	500	500	600
EN308 efficiency	%	84,4	84,2	84	83
Sound power level radiated by the enclosure LwA	dBA	71,3	70,7	73,8	77,8
Input/output flow	dBA	82,3	81,7	84,8	88,4
Extraction flow/fresh air intake	dBA	76,3	75,7	78,8	82,4
Optional internal heater	kW	4	8	11	13
Standard power consumption (without heater)	-	230-1+N/50Hz		400-3+N/50Hz	
	kW	1,2	1,7	2,6	3,8
Filtration efficiency	-	EN 779 F7 / M6 ISO 16890 ePM ₁ 55% / ePM ₁₀ 55%			
Dimensions	mm	1920x755x1180	2110x1075x1380	2300x1275x1480	2300x1275x1750

Dimension and weight

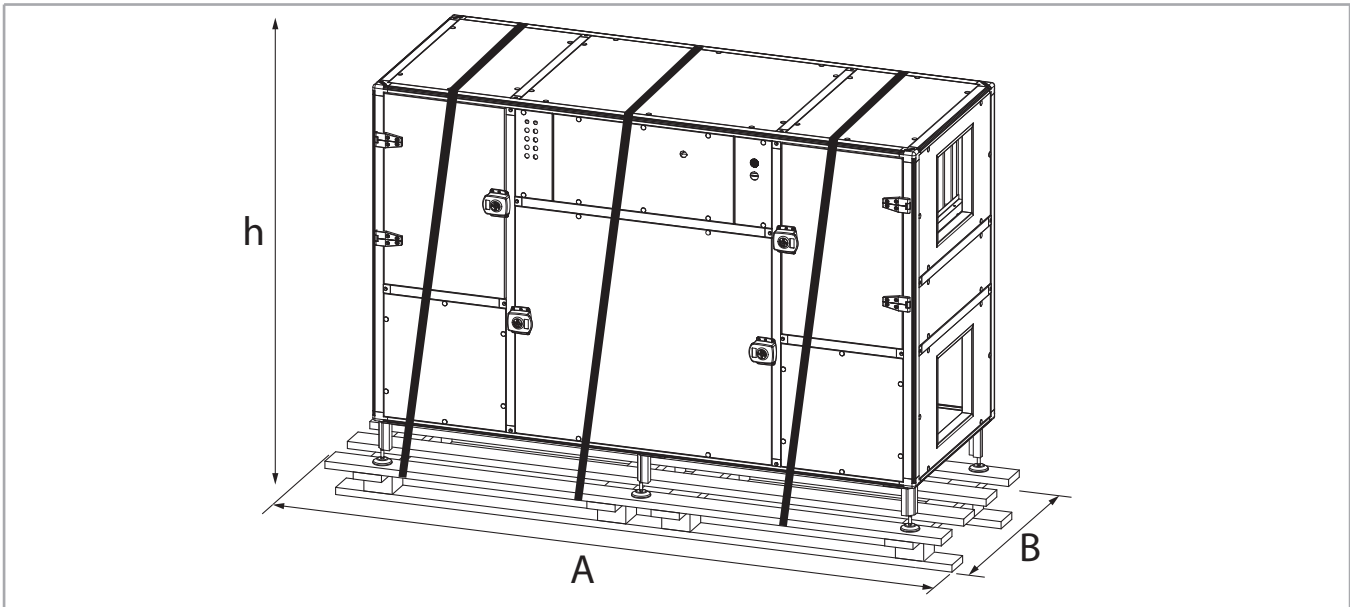


Model	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	WEIGHTS	
								with packaging	without packaging
ENY-PV2	1920	790	1180	433	673	300	320	245	220
ENY-PV3	2110	1110	1380	443	993	330	450	330	300
ENY-PV4	2300	1310	1480	443	1193	330	650	432	400
ENY-PV5	2300	1310	1750	578	1193	465	850	507	475

NOTE: To determine the height of the unit, note that it is equipped with feet for positioning on the floor. The feet can be adjusted from a minimum of 150 mm to a maximum of 200 mm.



Packed unit dimensions



Model	A (mm)	B (mm)	h (mm)
ENY-PV2	2200	815	1470
ENY-PV3	2360	1135	1670
ENY-PV4	2550	1340	1770
ENY-PV5	2550	1340	2040

Condensate drain position

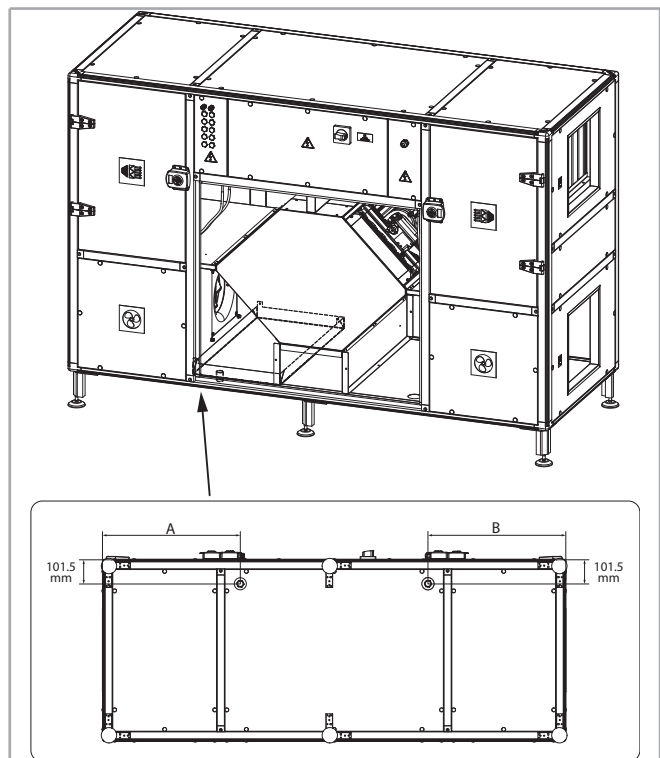
The table below lists the positioning dimensions related to the condensate drain tray.

The positioning of the condensate drain in left version units is referred to dimension A.

For right version units, the position of the tray is mirrored and therefore referred to dimension B.

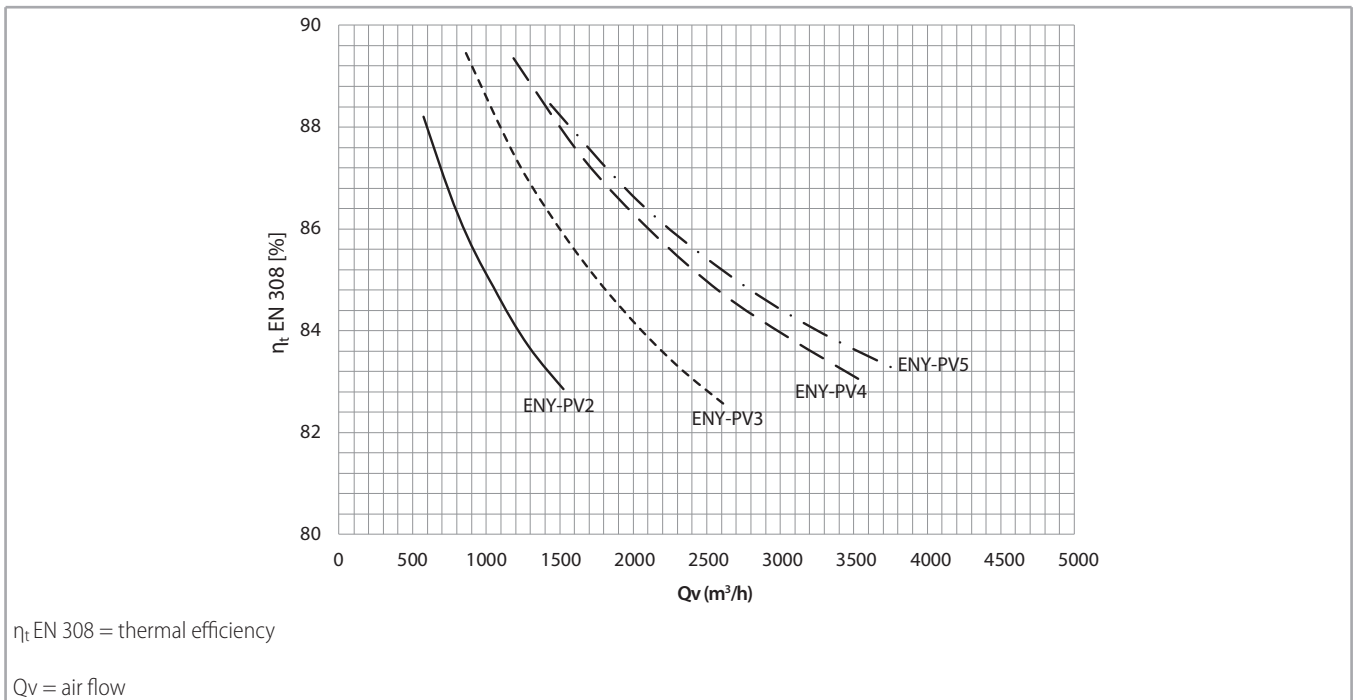
Model	A and B (mm)
ENY-PV2	571
ENY-PV3	581
ENY-PV4	581
ENY-PV5	581,5

Always provide a slope of min. 3% towards the condensate drain.



PERFORMANCE CURVES

Thermal efficiency of exchangers according to EN 308 (25 °C/5 °C) dry conditions

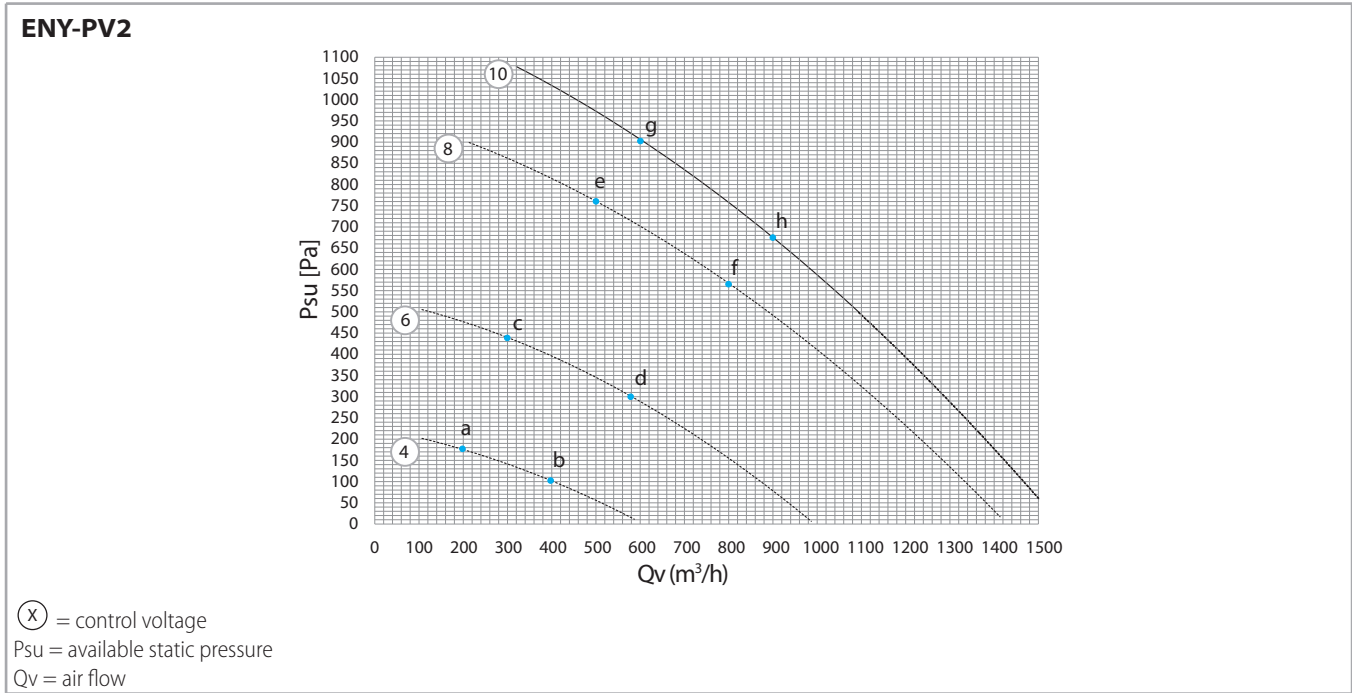


Typical curves

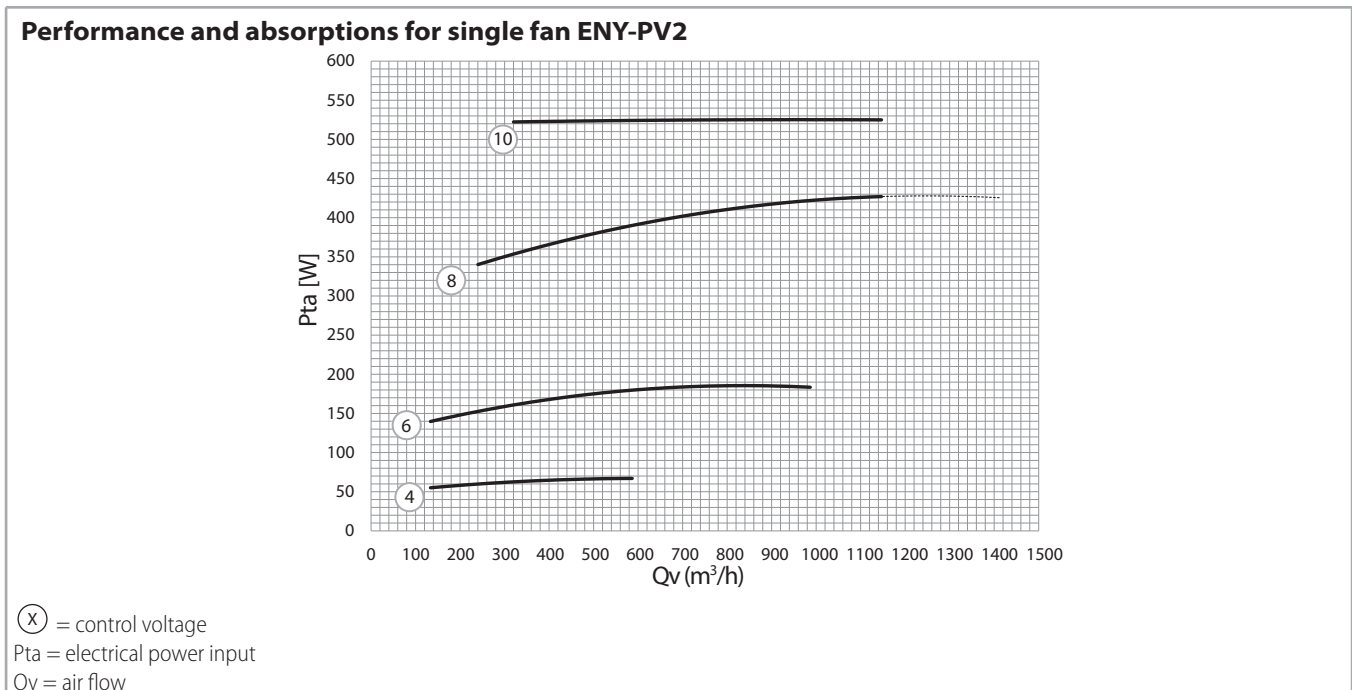
Units are available from the factory with target flow or differential pressure control.

The following diagrams show the flow rate/available static pressure curves of the units with cleaned filters at the different fan adjustment voltages.

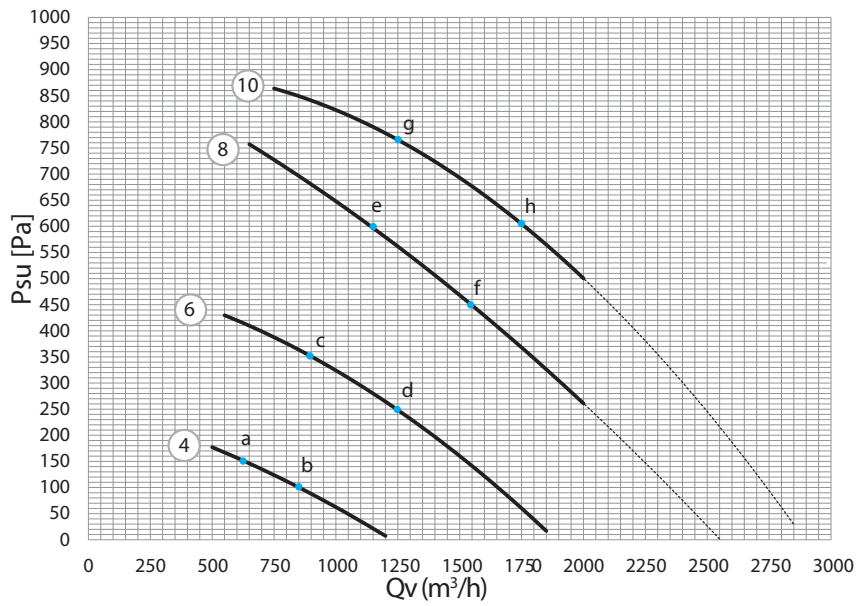
The performance can be used as a reference for both the inlet flow with ePM₁ 55% filter and the outlet flow with ePM₁₀ 55% filter.



ENY-PV2		a	b	c	d	e	f	g	h
Lw irradiated	dB(A)	57,4	52,7	67,7	64,6	74,5	71,4	76,9	73,4
Lw supply	dB(A)	60,4	55,7	70,7	67,6	77,5	74,4	79,9	76,4
Lw intake	dB(A)	46,4	41,7	56,7	53,6	63,5	60,4	65,9	62,4



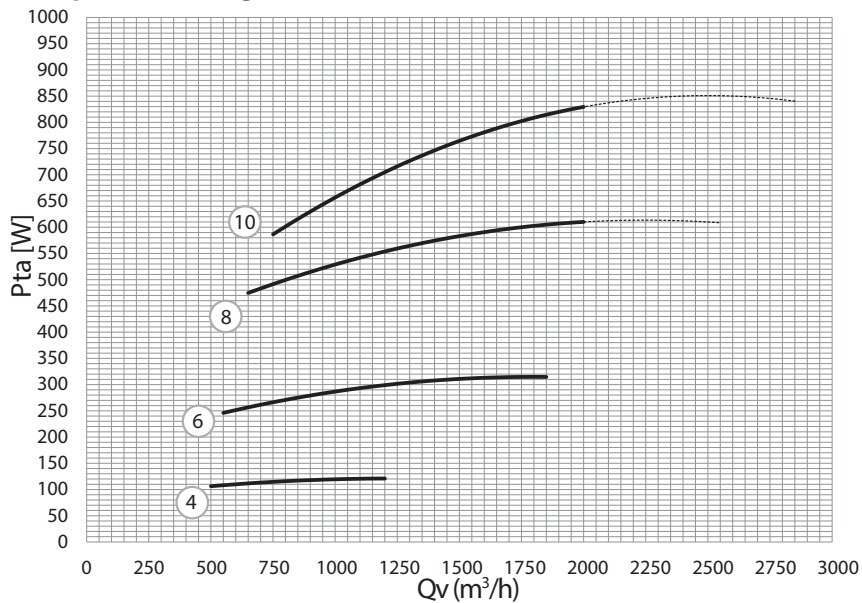
ENY-PV3



(X) = control voltage
 Psu = available static pressure
 Qv = air flow

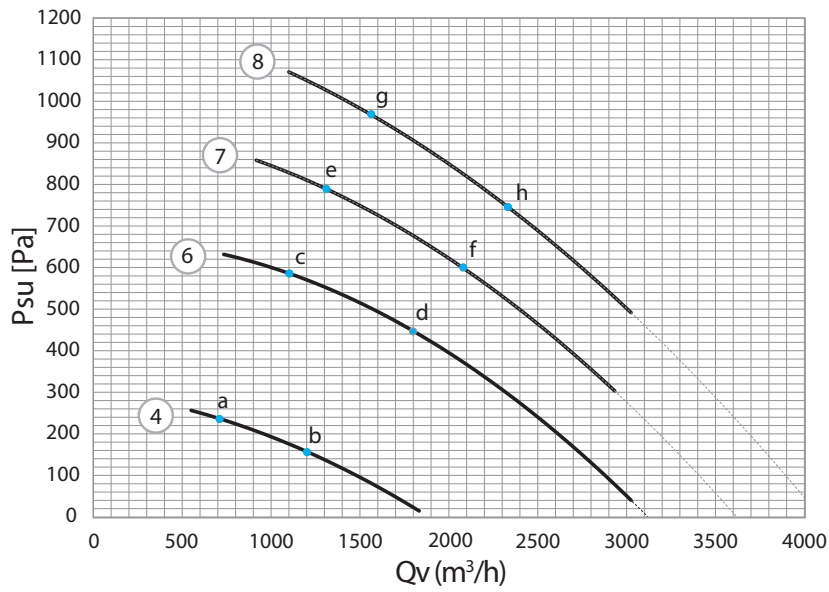
ENY-PV3		a	b	c	d	e	f	g	h
Lw irradiated	dB(A)	59,1	54,9	68,3	63,2	72,8	68,8	75,0	71,7
Lw supply	dB(A)	62,1	57,9	71,3	66,2	75,8	71,8	78,0	74,7
Lw intake	dB(A)	48,1	43,9	57,3	52,2	61,8	57,8	64,0	60,7

Performance and absorptions for single fan ENY-PV3



(X) = control voltage
 Pta = electrical power input
 Qv = air flow

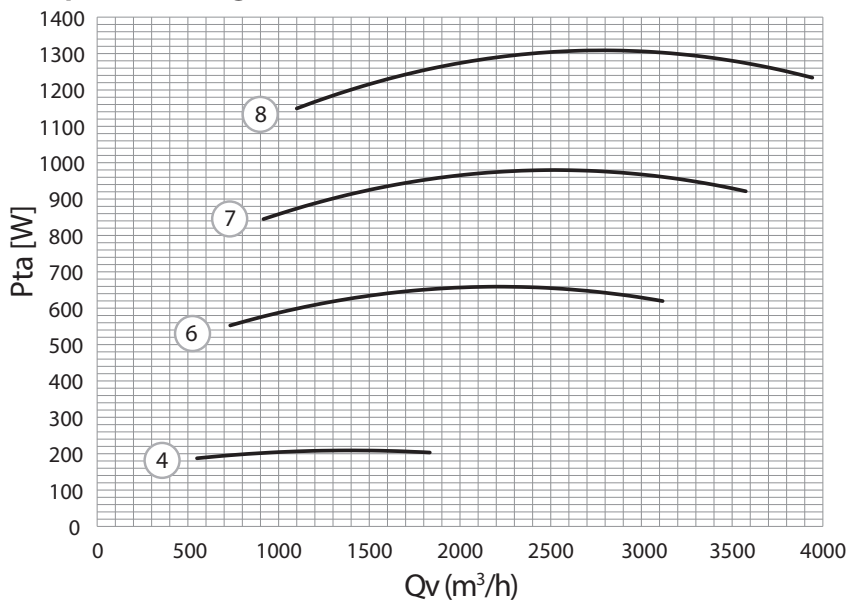
ENY-PV4



⊗ = control voltage
 Psu = available static pressure
 Qv = air flow

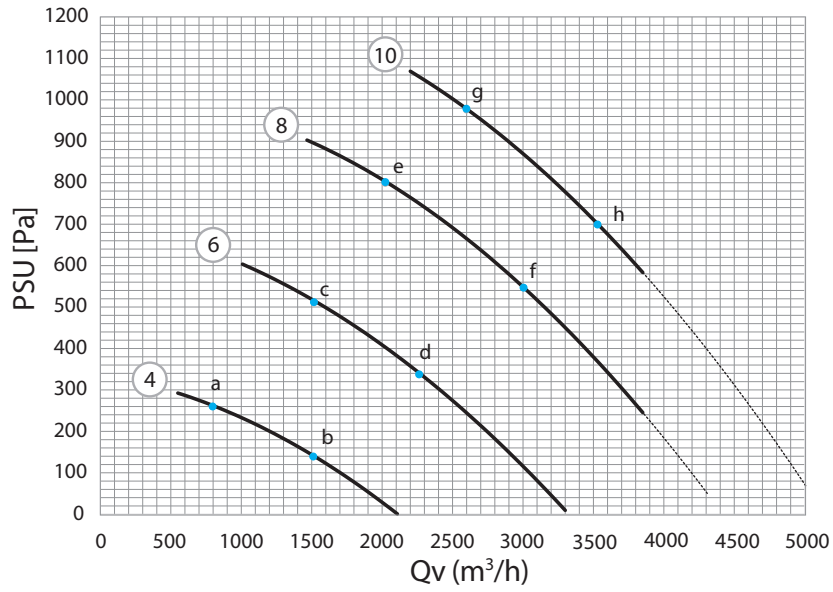
ENY-PV4		a	b	c	d	e	f	g	h
Lw irradiated	dB(A)	61,0	59,7	70,9	69,3	76,4	74,4	77,7	75,4
Lw supply	dB(A)	64,0	62,7	73,9	72,3	79,5	77,5	80,7	78,4
Lw intake	dB(A)	50,0	48,7	59,9	58,3	65,1	63,1	66,7	64,4

Performance and absorptions for single fan ENY-PV4



⊗ = control voltage
 Pta = electrical power input
 Qv = air flow
 ENY-PV4 Maximum voltage regulation 8 Vdc

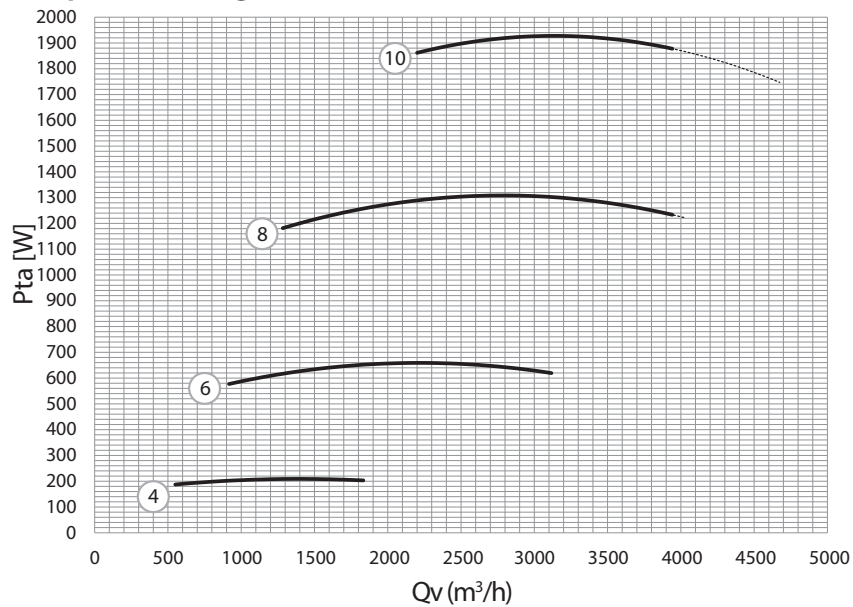
ENY-PV5



⊗ = control voltage
 Psu = available static pressure
 Qv = air flow

ENY-PV5		a	b	c	d	e	f	g	h
Lw irradiated	dB(A)	63,3	60,5	72,3	70,0	78,0	74,9	80,3	77,8
Lw supply	dB(A)	66,3	63,5	75,3	73,0	81,0	77,9	83,3	80,8
Lw intake	dB(A)	52,3	49,5	61,3	59,0	67,0	63,9	69,3	66,8

Performance and absorptions for single fan ENY-PV5

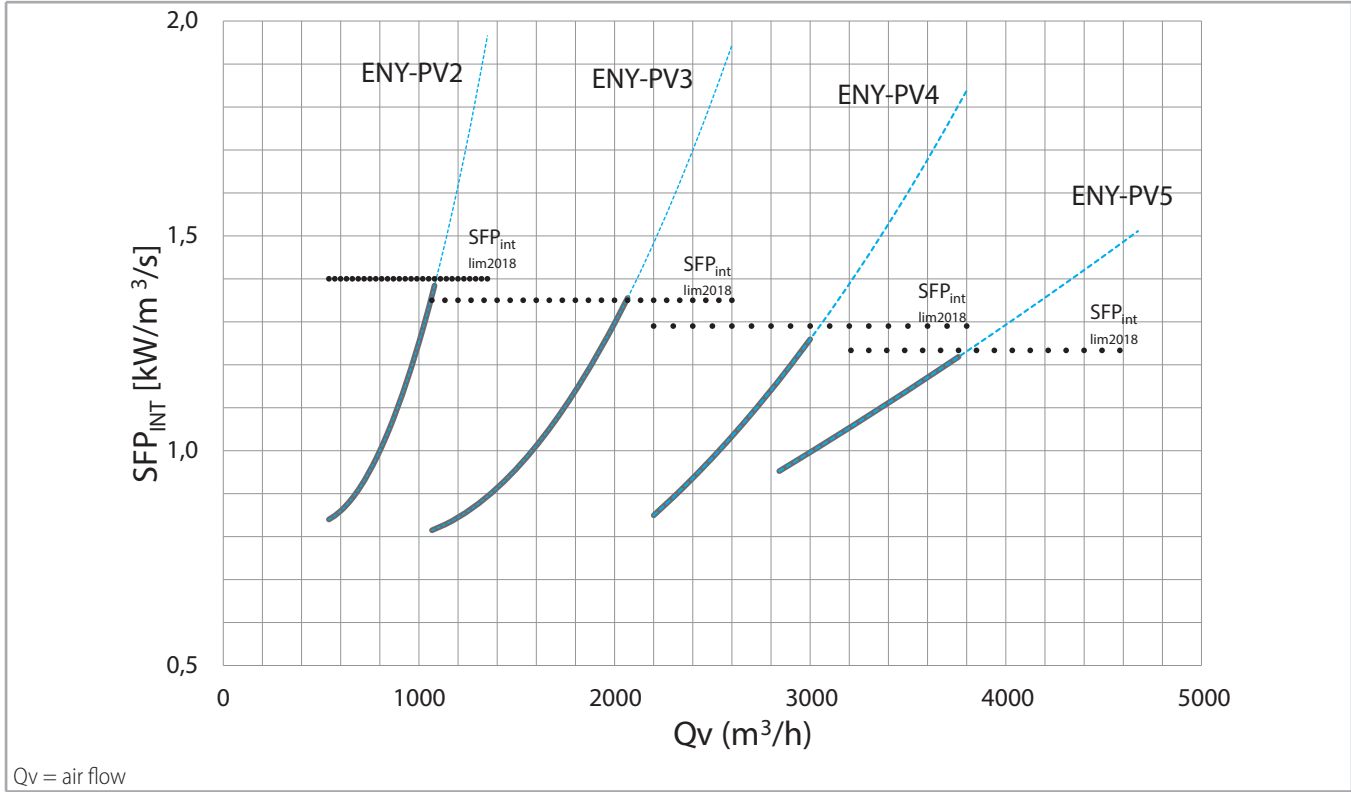


⊗ = control voltage
 Pta = electrical power input
 Qv = air flow

SFP_{int} flow rate curves

Below is evidence of compliance with EU Regulation 1253/14 for non-residential ventilation units, in relation to the requirement for maximum specific draw due to SFP_{int} internal pressure drops.

ENY-PV units comply with the regulation up to operating capacities corresponding to the nominal flow rate.



ANNEX EU 1253/14

Trade name of manufacturer	Energy Plus Vertical			
Manufacturer ID	ENY-PV2	ENY-PV3	ENY-PV4	ENY-PV5
Type HRS	Static Countercurrent			
Heat recovery efficiency (%)	84,40	84,20	84,00	83,00
Nominal flow rate of the NRVU (m ³ /s)	0,42	0,56	0,83	1,07
Effective electric power consumption (W)	1044	1580	2460	3650
SFP int (W/m ³ /s)	1384	1345	1280	1230
SFP int_lim 2018 (W/m ³ /s)	1400	1350	1290	1233
Nominal external pressure Δps, ext (Pa)	500	500	500	600
Front filtration speed at design flow rate (m/s)	2,040	1,633	2,011	1,892
Internal pressure drop of ventilation components Δps, int (Pa)	650,48	769,34	783,76	753,14
Static efficiency of fans used as per Regulation (EU) No. 327/2011	53,90	57,20	61,23	61,23
Declared maximum percentage of external leakage (%) EN 13141-7	< 2	< 2	< 2	< 2
Declared maximum percentage of internal leakage (%) EN 13141-7	< 3	< 3	< 3	< 3
Energy performance or preferably energy classification of filters	Fresh Air ePM ₁ 55% Indoor Air ePM ₁₀ 55%			
Description of the visual filter warning signal for NRVUs intended to be used with filters	<p>Each filtration section is equipped with a differential pressure switch that opens the circuit of an ohmic line directly reported to the electronic board. When the limit fouling is reached, beyond which it is advisable to replace the filter, the signal is perceived by the board and is sent back to the user interface display, with the indication of the signalling code.</p> <p>The filter replacement alarm is enabled for information purposes only and does not affect the functionality of the ventilation unit, which remains unchanged.</p>			
Sound power level at the enclosure (LwA)	71,30	70,70	73,80	77,80
Internet address with disassembly instructions	www.sabiana.it			
Fan efficiency for effective power calculation (%)	47	61	65	66
Filter front area filters (m ²)	0,207	0,340	0,414	0,565

CONTROLS AND PC TOOLS

ENY-PV units are supplied as standard with PL-LINK wall control and have Modbus Slave RS485 connectivity.

PL-LINK



- Digital single-color liquid crystal wall control
- Multi-screen display with menus selectable by buttons
- Backlit screen
- Features:
 - Ventilation mode setting
 - Selection and modification of the weekly programme
 - Management of warnings and alarms
 - Setting the clock
 - Standby

Modbus

The Modbus RS485 protocol for integration into compatible BMS systems is available on request.

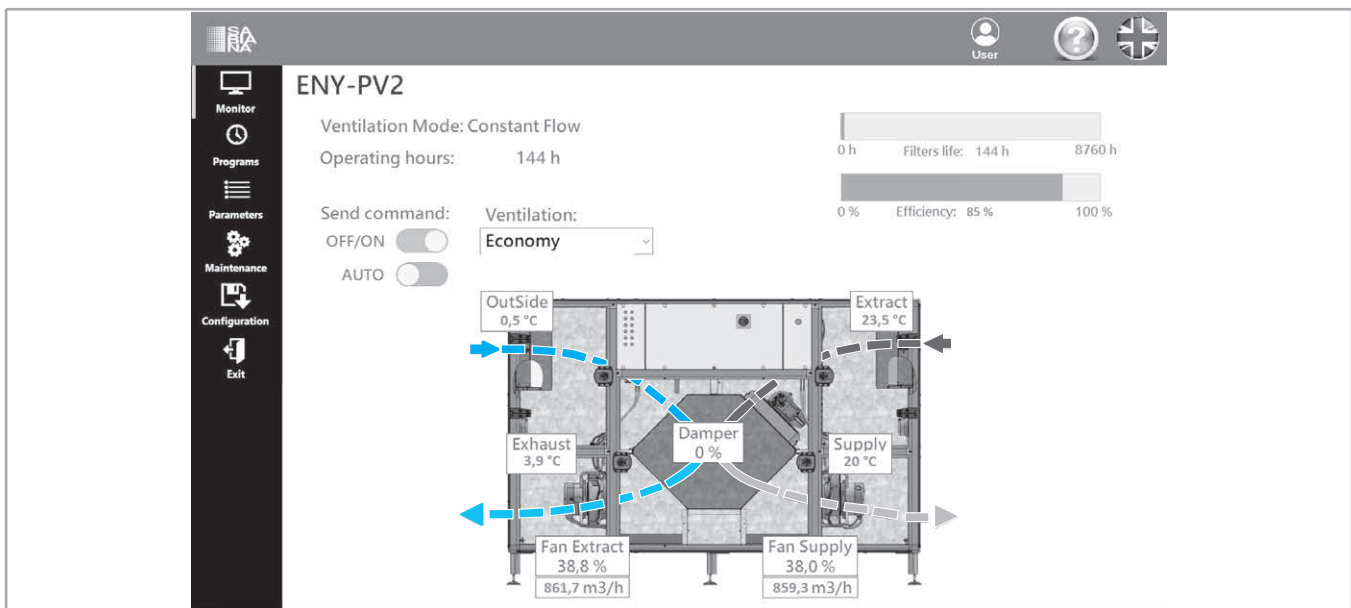
ENY-PV Manager

ENY-PV Manager, a software tool for PC, necessary to modify the factory operative parameters, is available on the Sabiana webpage.

The tool can be used connecting the PC to the Ethernet port on the board and, using BACnet communication, achieves different levels of operation:

- Basic features:
 - Target value settings for custom flow rates or differential pressures

- Weekly programme setting
- Displays of status, warnings and alarms
- Monitoring of unit operating variables
- Advanced functions:
 - Operative parameters change
 - Modification of electronic board configurations for addition of optional functions or maintenance operations with restoration



OPERATING LOGICS

Setting the flow rate

As mentioned in the introduction, if the units are applied to a single zone installation, it is advisable to select the versions equipped with continued flow rate control; on the other hand, if the installation is multi-zone, it is preferable to use those configured with constant differential pressure control.

Units with constant flow control

The basic operating logic of the units is based on the idea that there is a permanent operating flow rate that matches the design or selection flow rate of the machine.

The PL-LINK control allows you to select the design flow rate by activating the "Economy" mode.

There are also possibilities of hyperventilation operation (30% more than Economy - "Comfort" mode) or night-time or holiday attenuation (50% of the design value - "Unoccupied" mode).

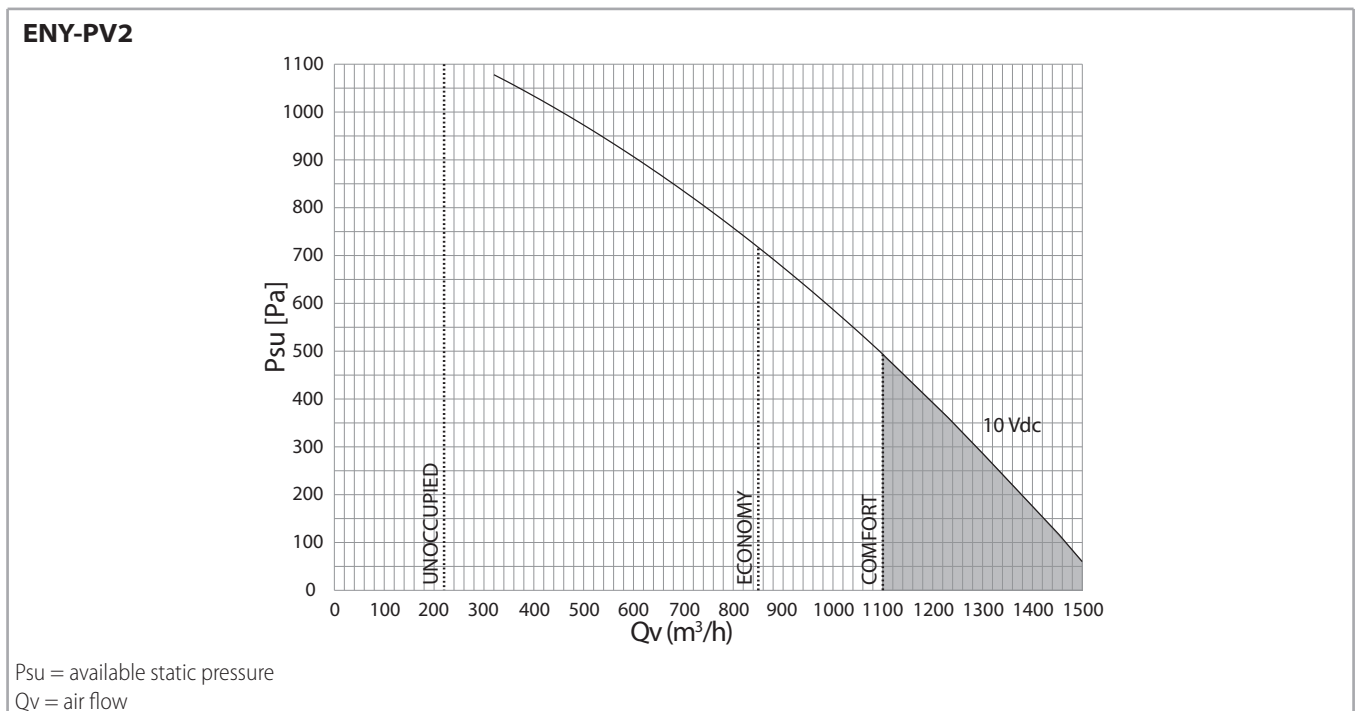
The units are pre-configured from the factory with pre-set settings for each of the above ventilation modes.

Model	Set design flow rate	Maximum set flow rate	Minimum set flow rate
	ECONOMY [m ³ /h]	COMFORT [m ³ /h]	UNOCCUPIED [m ³ /h]
ENY-PV2	850	1100	425
ENY-PV3	1550	2000	775
ENY-PV4	2300	3000	1150
ENY-PV5	3000	3850	1500

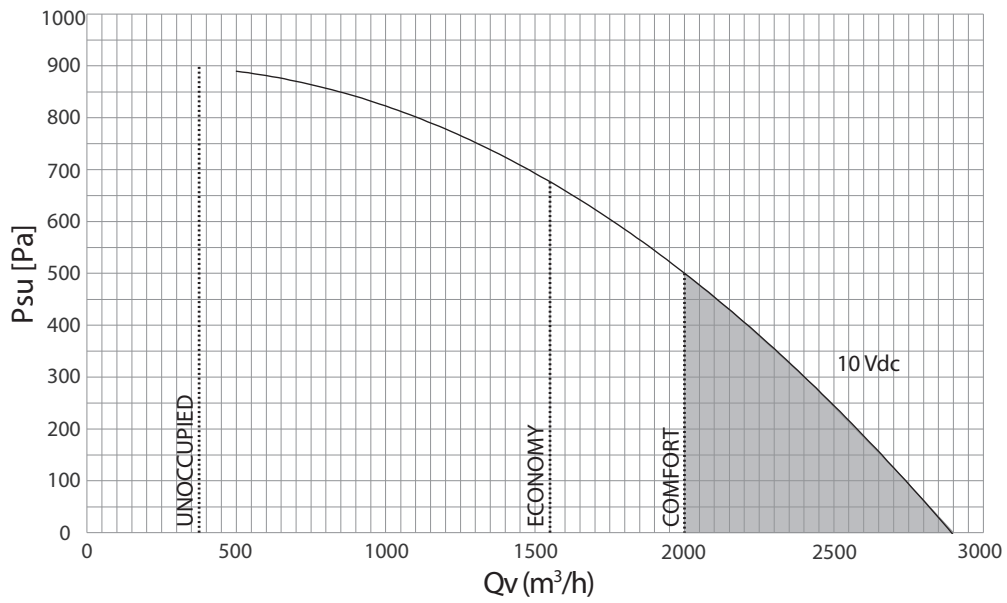
The pre-set ventilation modes can be selected individually via the wall control or combined in a weekly programme that can be set via the same control.

To change the factory settings, the ENY-PV Manager PC tool must be used.

The available control curves are shown below:

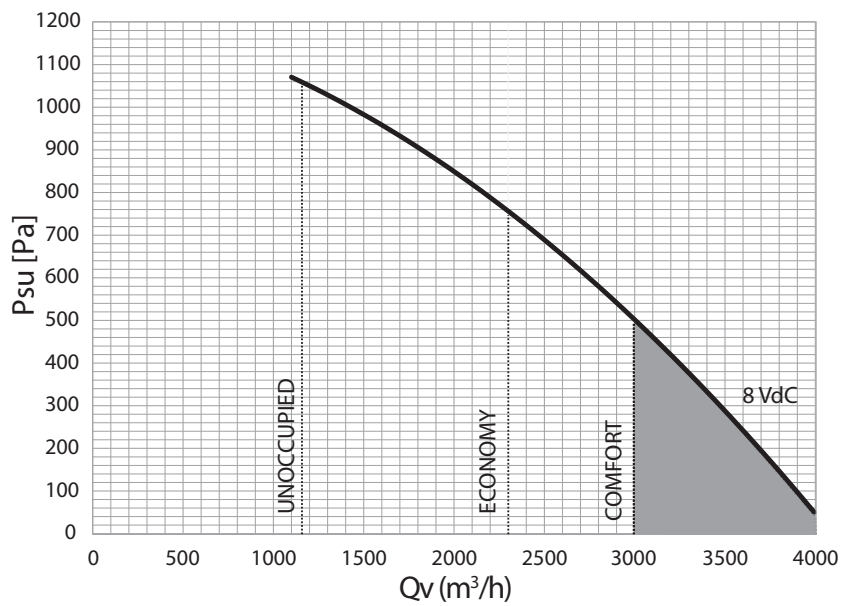


ENY-PV3

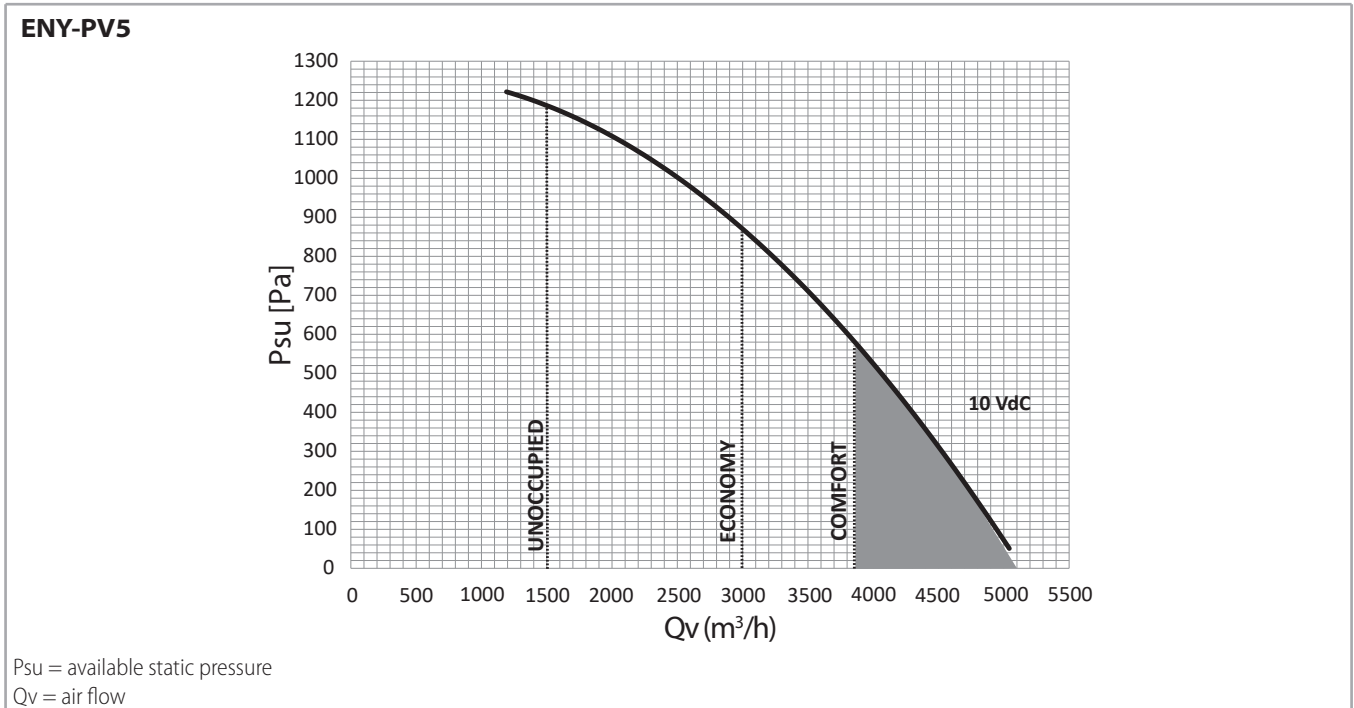


Psu = available static pressure
Qv = air flow

ENY-PV4



Psu = available static pressure
Qv = air flow



Units with constant differential pressure control

As with constant flow units, at a constant differential pressure, the unit must overcome a specified pressure drop for each flow in order to provide the desired design flow rate.

In this case, however, the basic operating logic assumes that the system to which the unit is applied is equipped with control dampers which activate, partialise or deactivate certain branches of the system and consequently modify the flow rate required from the central unit during operation. We speak of multi-zone systems because the flow rate in each zone can be adjusted independently of the others.

Compared to single-zone systems, in multi-zone systems it is preferable for the central unit to be able to respond to pressure fluctuations due to the opening or closing of the system dampers by modulating the flow rate supplied according to the demand and minimising pressure variations.

The control logic applied is that of variable flow rate, while keeping a constant differential pressure.

The ENY-PV units configured at constant differential pressure can modulate the flow rate according to the differential pressures measured at the ends of the unit outlets.

Discrete pre-set settings are also available from the factory for continued differential pressure controlled units, which can be adapted to different cases where the pressure drop at the design flow rate is higher or lower.

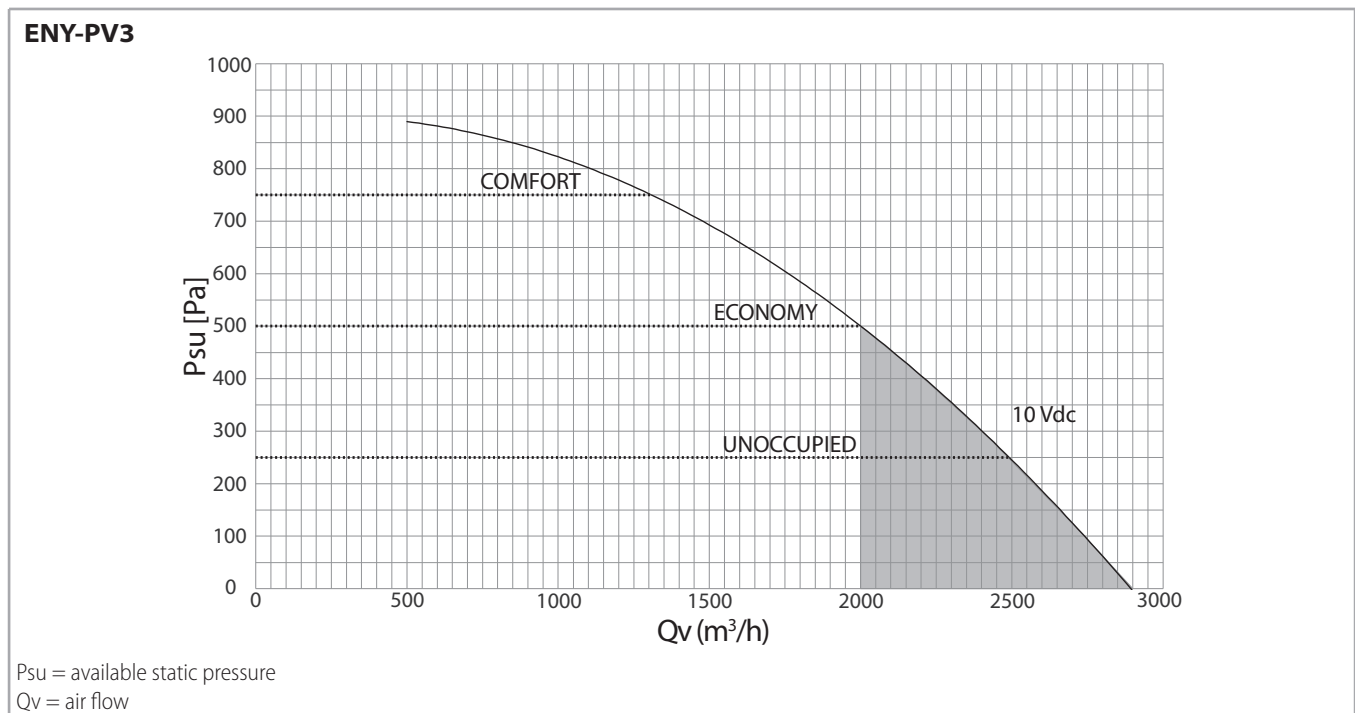
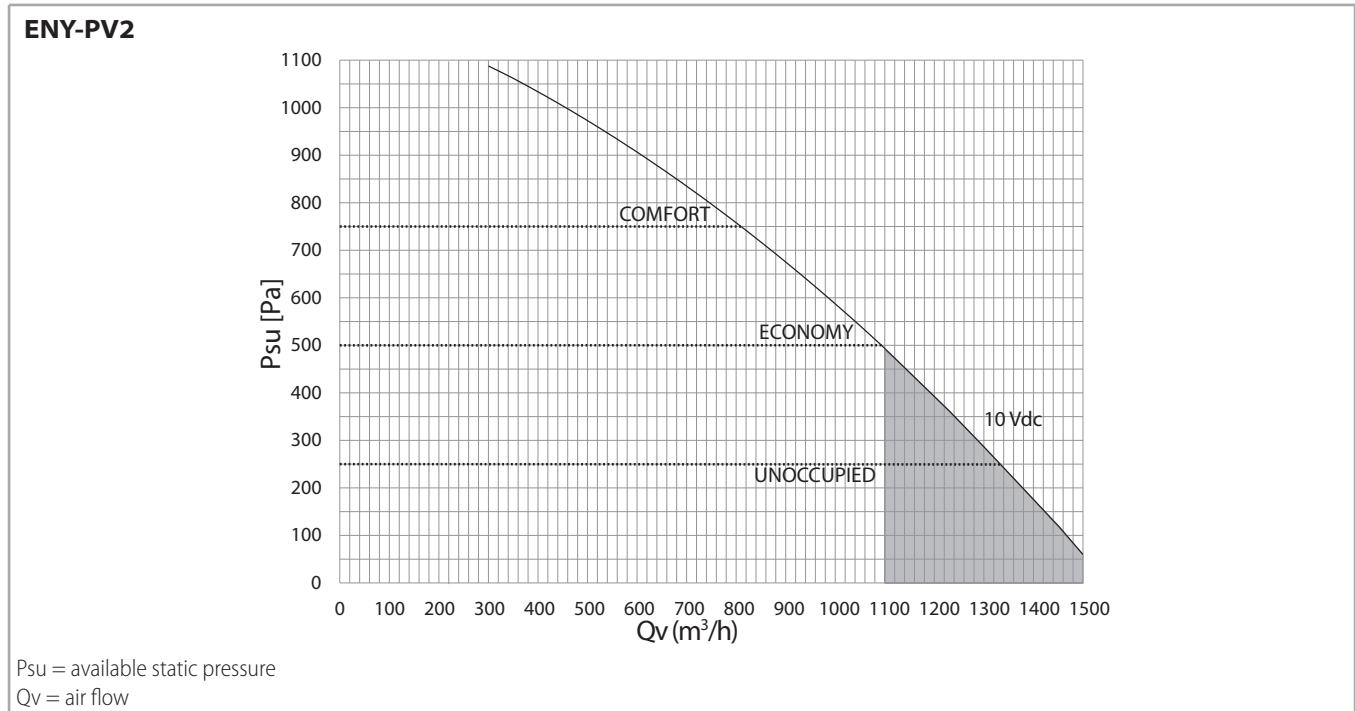
Set differential pressure	Set differential pressure	Set differential pressure
ECONOMY	COMFORT	UNOCCUPIED
[Pa]	[Pa]	[Pa]
500	750	250

For constant differential pressure units, the three ventilation modes must be interpreted as three possibilities of machine calibration in different system configurations that may occur.

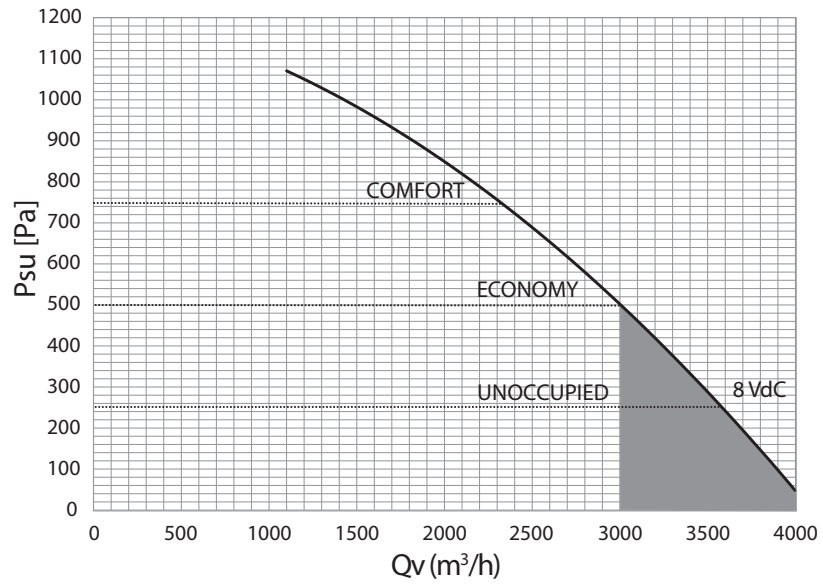
In these cases the unit should not be selected at a design flow rate "Economy", with respect to which temporary variations in flow rate are allowed, but should be selected based on its maximum flow rate, which the subordinate damper system will adjust according to the requirements of the individual zones, which may separately require flow rate reduction rather than hyperventilation.

To change the factory settings or differentiate them between the two flows, the ENY-PV Manager PC tool must be used.

The available control curves are shown below:

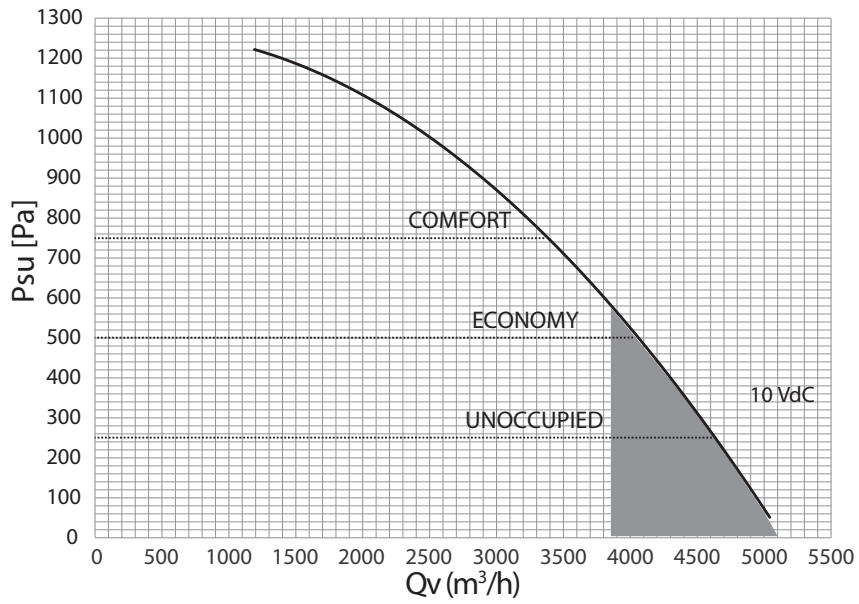


ENY-PV4



Psu = available static pressure
Qv = air flow

ENY-PV5



Psu = available static pressure
Qv = air flow

Operating logics

ENY-PV units are equipped as standard with the following sensor devices and automatic control:

Sensors

- No. 4 NTC temperature probes located respectively on the flows
 - Fresh air intake
 - Supply
 - Extraction from the occupied environment
 - Expulsion
- Differential pressure switches for detecting the exceeding of the state of dirtiness of the filters that requires their replacement
- Differential pressure transducers for ventilation mode control

Automatic control power-assisted systems

- Electronic plug-fans controlled with 0-10 V analogue signal for constant speed control
- 0-10 V modulating actuator to control the opening and closing of the by-pass damper located on the counterflow heat exchanger
- For units designed for colder climates, modulating heater controlled by a 0-10 V analogue signal to control the outlet temperature in order to prevent the formation of ice in the exchanger

The electronic control board is programmed with the following operating logics using the sensor readings for the implementation of the servo-controlled systems.

Flow rate control

The flow rate control occurs through a PID loop that operates the adjustment voltage of the electronic fans in order to reach the differential pressure targets read by the transducers present in the central panel.

Depending on the pneumatic configuration of the specific unit, the target differential pressure points either to a flow target or to a static differential pressure target at the ends of the machine.

By-pass damper opening control

The by-pass damper is controlled by a 0-10 V modulating signal in order to maintain the inlet temperature set-point established according to a compensation curve.

Its purpose is to take advantage of full heat recovery in winter, avoiding cases of discomfort due to currents of inlet cold air, and to maintain in other cases a supply temperature of not less than 20 °C at the outlet of the unit.

To change these settings, you need to use the advanced functions of the ENY-PV Manager PC Tool.

Based on the comparison between the temperature of the fresh air flow and the current inlet temperature, the central control board is able to determine whether the damper should work in by-pass, partial recovery or total recovery.

Checking the fouling status of the filters

At the ends of each filter, the static pressure drops is detected by a differential pressure switch. The pressure switch transmits the signal to replace the filters when the limit value of 160 Pa of pressure drop is exceeded, due to the increase of the resistance opposed to the flow by the fabric following the accumulation of dirt on the filters.

Antifreeze management

When the outlet temperature drops below 3 °C, there may be conditions for localized freezing of the exchanger, which in the long run could lead to plate breakage or obstruction of the flows.

To avoid this condition and according to the type of unit selected, the following antifreeze logics are activated:

- Constant flow units without resistance:
 - Inlet: 70% of ECONOMY setting
 - Extraction: ECONOMY
 - Cycle time depending on the achievement of the target exhaust temperature
- Constant differential pressure machine without heater:
 - Input and output: Economy
 - Bypass opening at 30%
 - Minimum lifetime of the defrosting cycle: 3 minutes

CAUTION: The minimum continuous operating temperature for units without a heater is -8 °C. In case of lower outdoor temperatures, the use of active frost protection systems is mandatory.

- Units with integrated heater:
 - Heater activation with fresh air temperature below 0 °C
 - Power modulation with variable outlet temperature set-point from 5 °C to 7 °C according to a compensation curve based on the fresh air temperature. (5 °C @ TOA >= 0 °C, 7 °C @ TOA <= -15 °C)

Ventilation control when adding air quality sensors

The air quality sensors that can be connected to the ventilation units are:

- Relative humidity sensor
- CO₂ concentration sensor

Specific accessories dedicated to ventilation units are not available. However, they can be purchased separately according to the basic requirements below:

- Sensor 0-10V output analog signal
- Humidity sensors: range 100%
- CO₂ sensors: range 0-2000 ppm

One or two air quality sensors can be connected to the unit (located in the outlet duct or inside a room). You can define limit values for each of the ventilation modes (Comfort, Economy and Unoccupied).

If the detection of the air quality parameter exceeds the set limit value, the target flow rate of the fans is increased by means of a PI control. The target flow rate is limited in each case to the maximum value of the comfort ventilation mode.

If humidity and CO₂ sensors are connected to the board at the same time, control priority is given to the target with the greatest variation in ventilation modulation.

Ventilation units are not configured at the factory to receive the signal from an air quality probe

For this purpose you need to make the appropriate integration to the configuration of the electronic board provided using the ENY-PV Manager PC tool.

General recommendations for units with constant differential pressure control

The units with variable flow rate and constant differential pressure at the ends of the machine are generally applied to systems equipped with adjustment dampers aimed at obtaining different flow rates for different zones.

In this case we recommend the following:

- To avoid conflicts between the flow rates required by the dampers and the flow rates made available by the central unit, in case of activation of the anti-freeze logic, the by-pass damper is used, which for low external temperatures could cause discomfort problems. In such cases it is recommended to select units equipped with active frost protection systems.
- If you want to use controls that are subordinate to the reading of air quality probes, they must be connected to the zone dampers adjusting the flow rate in the room. The sensors connected to the central unit provide only a reading of the air quality conditions without activating flow rate variation logics.

Alarms

The unit can provide two types of signalling/alarms:

- type 1 alarms: involve machine stoppage
- type 2 alerts: do not cause the machine to stop, but may limit some of its functions

The complete list of available alarms can be found in the Installation, Operation and Maintenance Manual.

SELECTION EXAMPLE

Energy Plus Vertical units are designed for controlled air exchange in residential or commercial environments and allow to minimize heat loss due to ventilation. This product range has two different types of configurations:

- **Constant flow rate:** The selected unit is adjusted to provide the flow rate required by the user, regardless of the pressure value, within the operating limits of the machine. The choice of this configuration is indicated for single zone systems (single room) or for systems serving different rooms in which there is the same request for air exchange over time (operation similar to the single zone system).
- **Constant differential pressure:** The selected unit is adjusted to ensure the desired pressure difference value at the ends of the machine, regardless of the required flow rate value. This configuration is suitable for multi-zone systems, where the flow rate requirements of individual rooms are staggered over time. The unit will provide a variable flow rate based on the actual air change demand of the individual zones.

The regulatory equipment available to the designer for the determination of the design flow rates for ventilation units is complex and different standards are available depending on the scope or the country of reference.

As an indication and not an exhaustive list, we would like to mention the EN 16798 standard for non residential ambients and UNI 10339 for residential ambients.

The application of the calculation standards leads to the determination of the design flow rates for the inlet air (Q_{SN}) and for the exhaust air (Q_{EN}) for the fan unit.

Two different methods of selecting the ventilation units are suggested, depending on whether they are applied to single-zone (constant flow rate) or multi-zone (constant differential pressure) systems.

Units with CONSTANT FLOW RATE configuration

In single-zone systems, the design exchange flow rate for the two flows can be understood as the flow rate that provides breathing comfort under the assumptions of usual or design occupancy.

In this case, consideration should always be given to the possibility that a temporary hyper-ventilation benefit may be required in the event of extraordinary occupancy rates.

For this reason it is advisable to select the units by comparing the highest of the calculation flow rates to the

flow rate available in Economy mode and to check the pressure drops in Comfort hyper-ventilation mode.

Once Q_{SN} has been calculated, it will be up to the designer to evaluate the need for outlet flow balancing (Q_{EN}) and the values of the static design pressures to overcome the pressure drops of the distribution system (Δp_{SN} , Δp_{EN}).

Once the nominal flow rate and static pressure values have been defined, the pressure-to-flow rate diagrams can be used to identify the most suitable model.

As said, it is suggested to select the model in order to activate the "Comfort" modes that aim to increase the nominal flow rate by 30%, with a consequent increase of the required static pressure.

Selection procedure:

1. The maximum inlet and maximum outlet flow rates are defined as follows:
 - A. $Q_{SN_max} = 1,3 Q_{SN}$
 - B. $Q_{EN_max} = 1,3 Q_{EN}$
2. Identify the model whose declared maximum flow rate is just above the maximum value between Q_{SN_max} and Q_{EN_max} .
3. Verify that the following maximum inlet and outlet points are within the operating ranges of the selected unit fans:
 - A. (Q_{SN_max} ; Δp_{SN_max}), where $\Delta p_{SN_max} = 1,7 \Delta p_{SN}$
 - B. (Q_{EN_max} ; Δp_{EN_max}), where $\Delta p_{EN_max} = 1,7 \Delta p_{EN}$
4. In case of negative result, try a larger model.

Let's suppose a designer is interested in an ENY-PV unit for air exchange inside an office. Let's also assume that the unit only needs to serve 5 open space offices, whose demand is simultaneous in time.

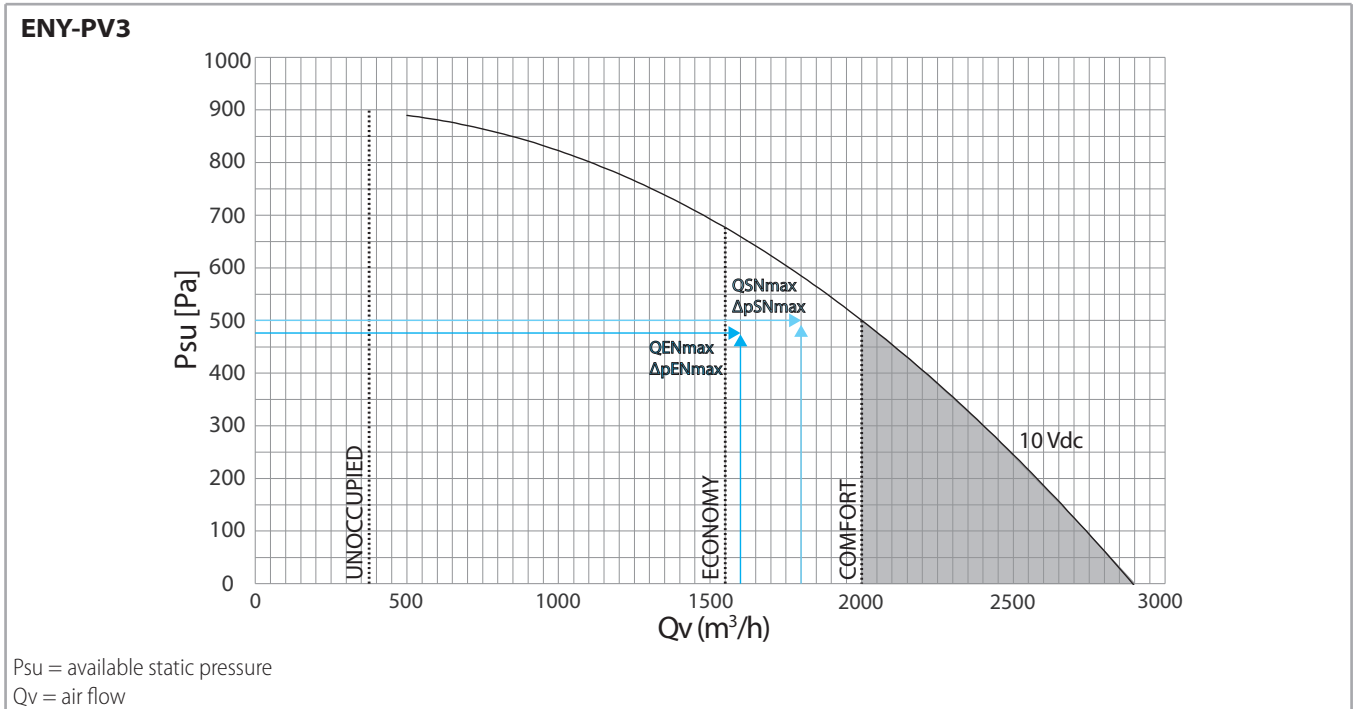
Let's suppose that the designer's calculation results in the following data, with the identification of maximum flows:

Inlet flow	Outlet flow
$Q_{SN} = 270 \text{ m}^3/\text{h} * 5 \text{ rooms} = 1350 \text{ m}^3/\text{h}$	$Q_{EN} = 250 \text{ m}^3/\text{h} * 5 \text{ rooms} = 1250 \text{ m}^3/\text{h}$
$\Delta p_{SN} = 295 \text{ Pa}$	$\Delta p_{EN} = 280 \text{ Pa}$
$Q_{SN_max} = 1,3 Q_{SN} = 1755 \text{ m}^3/\text{h}$	$Q_{EN_max} = 1,3 Q_{EN} = 1625 \text{ m}^3/\text{h}$
$\Delta p_{SN_max} = 1,7 \Delta p_{SN} = 500 \text{ Pa}$	$\Delta p_{EN_max} = 1,7 \Delta p_{EN} = 476 \text{ Pa}$
Quick selection flow rate $Q_{QS} = \max(1755; 1625) = 1755 \text{ m}^3/\text{h}$	

	ENY-PV2	ENY-PV3	ENY-PV4	ENY-PV5
$Q_{COMFORT} [\text{m}^3/\text{h}]$	1100	2000	3000	3850
$Q_{ECONOMY} [\text{m}^3/\text{h}]$	850	1550	2300	3000

You need to check whether the ENY-PV3 unit is able to supply the available static pressure in the most critical conditions of COMFORT mode and therefore you need

to check whether the operating points ($Q_{SNmax}/\Delta p_{SNmax}$) and ($Q_{ENmax}/\Delta p_{ENmax}$) are inside the operating range of the unit.



The ENY-PV units are supplied with pre-selected parameters and, in this case, the selection of the ENY-PV3 involves the fact of having an ECONOMY flow rate of 1550 m³/h higher than the desired minimum design value of 1350 m³/h.

In order to calibrate the unit to the exact desired value, the ENY-PV Manager PC Tool must be used.

Units with CONSTANT DIFFERENTIAL PRESSURE configuration

In the case of multi-zone systems, generally the flow rate that the designer is called upon to calculate for the central unit must already take into account the surcharges for any hyperventilation of some zones and in the same way the pressure drops of the most disadvantaged paths must consider the most disadvantaged operating modes. It is always up to the designer to evaluate the application of any contemporaneity coefficients in order not to oversize the central unit.

The input data to the multi-section unit are therefore already the points ($Q_{SNmax}/\Delta p_{SNmax}$) and ($Q_{ENmax}/\Delta p_{ENmax}$).

Selection procedure:

1. Quick selection procedure, through the "Quick selection diagrams and table".
Identify the model whose declared maximum flow rate is just above the maximum value between Q_{SNmax} and Q_{ENmax} .

2. Check that the following maximum inlet and outlet points are within the operating possible ranges of the selected unit fans:
 - A. (Q_{SNmax} ; Δp_{SNmax})
 - B. (Q_{ENmax} ; Δp_{ENmax})
3. Select the constant differential pressure control curve that best suits your project requirements.
4. If a suitable curve is not present, try a larger model.

Let's suppose a designer is interested in an ENY-PV unit to be installed for the same office as in the previous case. Let's assume, however, that in this case the unit must serve not only the five open space offices, whose demand is simultaneous in time, but also three meeting rooms whose ventilation load is variable in time.

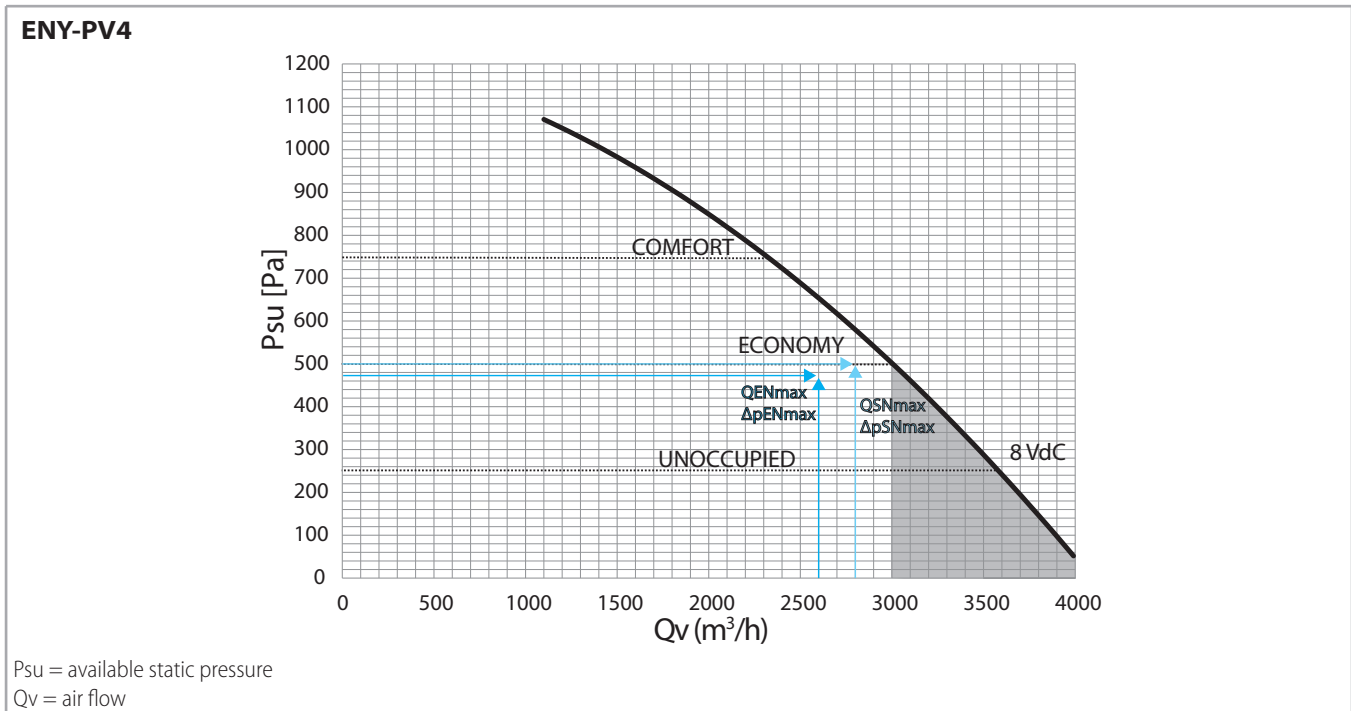
Let's suppose that the designer's calculation results in the following data, with the identification of maximum flows:

Supply flow	Outlet flow
$Q_{SNmax} = 2800 \text{ m}^3/\text{h}$	$Q_{ENmax} = 2600 \text{ m}^3/\text{h}$
$\Delta p_{SNmax} = 500 \text{ Pa}$	$\Delta p_{ENmax} = 476 \text{ Pa}$
Quick selection flow rate $Q_{QS} = \max(2800; 2600) = 2800 \text{ m}^3/\text{h}$	

	ENY-PV2	ENY-PV3	ENY-PV4	ENY-PV5
$Q_{max} [\text{m}^3/\text{h}]$	1100	2000	3000	3850
$Q_{diff} [\text{m}^3/\text{h}]$	850	1550	2300	3000

You need to verify that the ENY-PV4 model provides control curves that fit the needs of the project operating points. Specifically, the control curve to be selected

must always be positioned at flow rate and pressure values higher than the design working points.



In this case, the ECONOMY setting of an "ENY-PV4DP..." is exactly what we need.

It is useful to remember that for units configured at constant differential pressure the ECONOMY, COMFORT and UNOCCUPIED modes do not correspond to different permanent or temporary ventilation modes but to different control curves at variable flow rate with respect to different levels of expected pressure drops (systems with greater or minor drops) or levels of differential control pressure.

The ENY-PV units are supplied with pre-selected parameters and the selection in this case of the ENY-PV4 involves the fact of having a maximum operating pressure of the extraction flow that will be higher than the desired one and will be determined by the selected pre-set curve.

In order to calibrate the unit to the exact desired value, or to differentiate the calibration between the two fans, the ENY-PV Manager PC Tool must be used.

Il presente documento annulla e sostituisce il certificato di pari numero emesso in data 06/05/2022.



IQNet, the association of the world's first class certification bodies, is the largest provider of management system certification in the world. IQNet is composed of more than 30 bodies and counts over 150 subsidiaries all over the globe.

CERTIFICATO N. 0545/8
 CERTIFICATE No. _____

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 WE HEREBY CERTIFY THAT THE QUALITY MANAGEMENT SYSTEM OPERATED BY

SABIANA S.P.A.

Sede e Unità Operativa

Via Piave, 53 - 20011 Corbetta (MI) - Italia

Processi direzionali, primari e di supporto relativamente a Progettazione, produzione e assistenza di apparecchiature per il riscaldamento e il condizionamento dell'aria (aerotermi, termostrisce radianti, ventilconvettori e unità trattamento aria) e canne fumarie.

Unità Operative

Via Virgilio, 2 - 20013 Magenta (MI) - Italia

Produzione di ventilconvettori. Magazzino Logistica.

(Presente solo reparto produttivo, magazzino componenti e logistica: Magazzino P.F. e spedizione).

Via Zanella, 27 - 20011 Corbetta (MI) - Italia

Assemblaggio unità trattamento aria, lavorazioni meccaniche, saldatura, magazzino, assemblaggio recuperatori.

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UNI EN ISO 9001:2015

Sistema di Gestione per la Qualità / Quality Management System

PER LE SEGUENTI ATTIVITÀ / FOR THE FOLLOWING ACTIVITIES

EA: 18

Progettazione, produzione e assistenza di apparecchiature per il riscaldamento e il condizionamento dell'aria (aerotermi, termostrisce radianti, ventilconvettori e unità trattamento aria) e canne fumarie.

Design, production and service of heating and air conditioning equipment (unit heaters, radiant panels, fan coil units and air handling units) and chimneys.

Riferirsi alla documentazione del Sistema di Gestione per la Qualità aziendale per l'applicabilità dei requisiti della norma di riferimento.
 Refer to the documentation of the Quality Management System for details of application to reference standard requirements.

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